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Office of Statewide Health Planning and Development

PRELIMINARY REPORT

EVALUATION OF THE 2003 MODEL BUILDING CODES

June 11, 2003

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BACKGROUND

OSHPD Authority

The Office of Statewide Health Planning and Development (OSHPD) is the adopting and enforcing agency for the California Building Standards Code, Title 24, California Code of Regulations (CCR), with application to Hospitals, Skilled Nursing Facilities, Correctional Treatment Facilities, and Licensed Clinics. OSHPD has the authority to amend the adopted model building code as necessary to achieve the performance objectives defined in the Alfred E. Alquist Hospital Facilities Seismic Safety Act. OSHPD also promulgates administrative code provisions within Part 1, Title 24, CCR pertaining to enforcement of building standards.

Overview

The purpose of the building code is to provide for public safety, through an efficient and consistent set of rules for construction. The building code is not a design manual or a construction guide. Vague or contradictory language, rather than providing flexibility, in fact causes confusion and delays, as designers, contractors and building officials struggle to determine the meaning and intent of the code. In adopting a model code, the enforcing agency reviews and coordinates the code, amending it as necessary to meet its statutory requirements and eliminate conflicts and ambiguities.

OSHPD has evaluated the 2003 *NFPA 5000 Building Construction and Safety Code (NFPA 5000)* and the 2003 *International Building Code (IBC)* for adoption as the base document for 2004 *California Building Code (CBC)*. As part of the evaluation, OSHPD considered the structural and non-structural aspects of design and construction, as well as architectural and fire & life-safety provisions that affect structures regulated by OSHPD.

OSHPD has used a three-phase approach to our evaluation.

1. We have reviewed the level of safety provided by the model codes:
   - Compared to the current level of safety provided by the 2001 *CBC*, and
   - Compared to each other.

2. We have evaluated the amount of work needed to amend the codes as required for the design and review of health care facilities, considering:
   - The amendments needed to maintain the current level of safety,
   - The ease with which necessary amendments can be made, both through the model code development process and through California amendments,

- The use of referenced standards and publications, and the methods for resolving conflicts between referenced standards and the code, and the methods for resolving conflicts between different referenced standards and publications,
- The amount of work required to review and update Policy Intent Notices (PINs), Code Application Notices (CANs) and other documents.

3. We have evaluated the ease of use of the two model codes from both a design perspective and from a plan review/construction inspection point of view, including:
   - Consideration of the effort that will be required by OSHPD staff and local building officials to understand and enforce the code (local building departments are responsible for enforcement of licensed clinic regulations that OSHPD promulgates). This includes training needed to become proficient in the use of the code, in order to assure correct interpretation and to minimize the impact on plan review turnaround times,
   - Review of the types of support programs offered by ICC and NFPA.
   - Review the clarity and ease of use of the code for architects, engineers and other professionals involved in health care facility construction.

Evaluation Process

To perform our evaluation, OSHPD staff has:

- Performed a comparative review of the model codes and the 2001 CBC,
- Attended training presented by NFPA and the International Code Council (ICC),
- Reviewed code evaluation criteria suggested by interested parties,
- Attended public meetings held under the auspices of the California Building Standards Commission, State Fire Marshal and Division of the State Architect to hear testimony of interested parties,
- Reviewed code comparisons, summaries, and recommendations presented by individuals and professional organizations, and
- Requested clarification on different aspects of the model codes from both NFPA and ICC. The questions posed to the model code organizations and their responses are found in Attachment A (NFPA) and Attachment B (ICC).

OSHPD Review Team

OSHPD technical staff participated in the review of the model code documents through various state and local organizations, including the NFPA, ICC, ICBO, American Society of Civil Engineers (ASCE), Building Seismic Safety Council (BSSC), National Earthquake Hazard Reduction Program (NEHRP), the Structural Engineers Association of California (SEAOC) and the California State Fire Marshal. A summary of their relevant affiliations is summarized below:

- Susan Botelho – Staff Services Manager III
  - Chief, Regulations Development Section
  - Past President, California Capitol Chapter, ICBO
- Byron “BJ” Foster – Fire/Life Safety Officer

- Tom Hale – Senior Structural Engineer
    - Co-chair of the SEAOC Central Seismology Committee
    - Past-chair of the State SEAOC Seismology Committee
    - Member of the BSSC/NEHRP 2003 Provisions Technical Subcommittees TS-3 Foundations and Geotechnical Considerations, and TS-12 Base Isolation and Energy Dissipation.
- Don Harris – Senior Architect
    - Member, NFPA 5000 Committee on Health Care Occupancies
    - Member Code 2000 partnership egress working group
- John Gillengerten – Senior Structural Engineer
    - Member, Provisions Update Committee (PUC), BSSC/NEHRP Provisions 1994-present
    - Chairman of the BSSC/NEHRP Provisions Technical Subcommittee TS-8, Nonstructural Components and Systems, 1997-present
    - Member, ASCE 7 Task Committee on Earthquake Loads, 1998-present
    - Member BSSC Code Resource Structural Committee (CRSC), 1997-present
    - Member, NFPA 5000 Committee on Structures and Construction
- Bill Staehlin – Supervising Structural Engineer
    - Current President, SEAOC
    - Past President, Structural Engineers Association of Central California (SEAOCC)
    - Member, ASCE 7 Task Committee on Earthquake Loads, 1998-present
- Chris Tokas – SB 1953 Program Manager
    - Past President, SEAOCC
    - Member, ASCE 7 Task Committee on Earthquake Loads
    - Past Chair, SEAOCC Seismology Committee
    - Chair, SEAOC Seismology Committee, 2001 to present
    - Member, International Building Code Structural Committee, 1998 - 2002

Limitations of Evaluation

The task of evaluating two new code sets for adoption is monumental. In order to reduce the task to a manageable size, given the time and staff constraints, the scope of our evaluation was limited, and a number of assumptions were made:

- OSHPD's evaluation is limited to the Building Code.
- Our review was qualitative in nature. Not every potential conflict and problem (or remedy) is covered in this evaluation.
- We did not specifically review the Fire Codes. However, we strongly suggest that the Building and Fire codes that are adopted by California should be from the same "family," since coordination of these two documents is critical.
- We performed a cursory review of the mechanical and plumbing codes. OSHPD proposes that the Uniform Mechanical and Plumbing Codes published by the International Association of Plumbing and Mechanical Officials (IAPMO) should remain the codes adopted by California.

- We did not specifically review the electrical code. The National Electrical Code published by NFPA should remain the electrical code adopted by California.

EVALUATION

1. Level of Safety Provided by Model Codes

Regional versus National Code

The 2001 *CBC* encompasses over half a century of incremental improvements in the *Uniform Building Code (UBC)*. The *UBC* and *CBC* provisions have been developed in response to unique regional conditions, including California's high level of seismic activity. In contrast, both the *IBC* and *NFPA 5000* codes represent efforts to develop a single code to be used throughout the nation. As such, they differ significantly from the 2001 *CBC*, in some areas being more conservative, in others less.

Architectural Provisions

In examining the level of safety provided by the proposed model codes compared to the current *CBC*, both the *IBC* and *NFPA 5000* offer substantially reduced levels of protection than are currently enjoyed under the *CBC*. This reduction is primarily due to tradeoffs in the *IBC* and *NFPA 5000* for fire sprinklers, and increased allowable heights and areas in these codes.

Another major reduction in the level of protection for hospitals and skilled nursing facilities in both the *IBC* and *NFPA 5000* compared to the CBC is the allowance of non-fire-rated corridors in hospitals and skilled nursing facilities protected with fire sprinklers. However, *NFPA 5000* goes even farther in Section 19.3.6.1(1), allowing spaces of unlimited area to be open to the corridor, provided they are not used for patient sleeping rooms, treatment rooms or hazardous areas. This would allow hospitals with virtually no walls, except for a few specific types of rooms and smoke barrier walls.

A significant difference that will affect buildings under OSHPD's jurisdiction is that *NFPA 5000* treats ambulatory healthcare occupancies (clinics) as business occupancies with regard to height and area. This allows surgical clinics in buildings that are much larger and taller than the current CBC allows, and even larger than the *IBC* would allow.

Structural Provisions

The structural provisions of *IBC* and *NFPA 5000* follow a developing trend that began with the 1997 *UBC*. In the 1997 *UBC*, the National Earthquake Hazard Reduction Program *Recommended Provisions for Seismic Regulations for New Buildings* (*NEHRP Provisions*) became the technical basis for the seismic design provisions of the *UBC*, replacing the recommended seismic provisions promulgated by the Structural Engineers Association of California.

The seismic design methodology, upon which both the *IBC* and *NFPA 5000* are based, is dramatically different from that in 2001 *CBC*. The concept of seismic zones, which divided the state into two levels of risk, has been replaced with contour maps showing expected ground shaking intensity. Since all of California was classified in seismic zones 3 or 4 (the areas of highest risk), building systems like unreinforced masonry (URM), which have historically performed very poorly in earthquakes, were prohibited.

As a result of the new seismic hazard mapping approach used in the *IBC* and *NFPA 5000*, earthquake design lateral force levels now vary dramatically from one part of the state to another. In the 2001 *CBC*, the difference between design force levels between regions of highest and lowest seismic activity in California was a factor of 2. Under either proposed code, the difference will be a factor of 8 to 10. The proposed codes will allow the reintroduction of low ductility structural systems (such as unreinforced concrete and URM), which have not been permitted in California for 70 years. We believe that this is an unintended consequence of the change in seismic design procedures, reflected by the fact that there are currently code change proposals under consideration for the 2003 edition of the *NEHRP Provisions* that will restrict the use of the low ductility systems in areas of moderate seismicity nationwide, including areas of California. However, even if these proposals are successful, it will be at least 3 years before the changes are reflected in *ASCE 7-05 Minimum Design Loads for Buildings and Other Structures* (2005 edition), the primary source document for seismic design used by both model codes. In the interim, state and local enforcement agencies will have to amend the code to restrict the use of these low-ductility building systems.

The practice of tying seismic detailing and design requirements to seismic zone has been abandoned. Seismic design requirements are now tied directly to the type of lateral force resisting system in the building. For example, the design and detailing requirements of a steel special moment frame building are the same whether the building is constructed in Los Angeles or Oklahoma City.

The use of certain structural systems is limited by the Seismic Design Category (SDC) of the building, which is a function of ground shaking potential and occupancy. All buildings in the same SDC are subject to the same general requirements. For example, the structural system of a hospital in Sacramento (Seismic Design Category D) will be designed to the same seismic requirements as a grocery store in San Diego (also Seismic Design Category D).

Regardless of which model code is chosen, significant amendments to the structural provisions of the code will be needed if the current level of safety in the 2001 *CBC* is to be maintained.

2. Ease of Amending the Code

Reference Standards and Publications

The *IBC* uses referenced standards to cover some aspects of building construction. *NFPA 5000* uses referenced publications to cover many aspects of building construction, and nearly all aspects of structural design. Both codes reference these documents rather than include the text of the design requirements directly in the code. This is a departure from the 2001 *CBC*, where most of the requirements for design were contained directly in the code, and any amendments are clearly shown in the context of the code language. In both *IBC* and *NFPA 5000*, much of the text commonly associated with structural design provisions has been replaced, in whole or in part, by references to *ASCE 7-02, Minimum Design Loads for Buildings and Other Structures. IBC* relies on referenced standards for steel and concrete design. In *NFPA 5000*, reliance on referenced publications is almost complete for all materials.

Although much progress as been made in coordinating the various referenced standards at the national level, there are still numerous conflicts and inconsistencies. These conflicts arise from a number causes, not the least of which is the fact that update and development cycles of the various referenced documents are not coordinated. In order for a building code to be easily usable and enforceable, the inconsistencies and conflicts must be resolved. If they are not resolved by the model code promulgating organization, then the adopting agency must use its resources to resolve conflicts.

In general, it is significantly more difficult to amend and use codes that make heavy use of referenced standards. The user must jump from standard to standard during the course of design or review. In addition, amended referenced standards can be difficult to use, because the code contains only the amendment, and the text of the referenced standard is generally not reproduced in the code. Hence, the user must first be aware that the standard has been amended, and then put the amendment into the proper context. The likelihood of errors is greatly increased. *NFPA 5000*, with its' complete reliance on referenced publications, will be more difficult to amend and use.

While *IBC* uses reference standards, *NFPA 5000* uses reference publications. The distinction is important. Referenced standards are likely to be written in concise, enforceable language. In contrast, the referenced publications in NFPA, while including many of the same referenced standards found in the IBC, also includes a significant number of guidelines and manuals. Although incorporated into NFPA 5000 by Section 2.1, the guidelines and manuals are typically neither concise nor enforceable.

The use of reference documents (standards or publications) puts a much greater burden on the bodies promulgating and adopting the model codes. The problem is

much greater in NFPA, due to the inclusion of guidelines and manuals into the code. In addition, conflicts between referenced standards are more difficult to identify in *NFPA 5000*, where standards are only referenced, compared to the *IBC*, where some of the text of the referenced standards is repeated in the model code.

Resolving Conflicts Between Referenced Documents

In order to produce an effective, usable code, the model code organizations must have an efficient mechanism in place to resolve conflicts between referenced documents. OSHPD has identified conflicts between referenced documents in both the *IBC* and *NFPA 5000*. It should be noted that due to staffing and time constraints, our review was limited, and it is expected that many more conflicts will be found during the code adoption process. We asked questions of both of the model code organizations on some of these conflicts, with two objectives: first, to determine how the apparent conflict can be resolved in the context of the code as written and second, to determine what mechanisms are used by the organization to deal with conflicting reference documents in the code development process. The relationship between the code and the referenced documents, and the manner in which conflicts between referenced documents are resolved, appears to be fundamentally different in the *IBC* and *NFPA 5000*.

The seismic design provisions of *ASCE 7-02* provide an illustration of the differences between the two model codes, and the importance of this issue. *ASCE 7-02* refers to specific sections in specific editions of the materials standards for steel, concrete, and masonry design. Without these specific references, the seismic design provisions of *ASCE 7-02* are not readily usable. Different editions of the same standards are not interchangeable. A conflict exists when the model code makes reference to a specific edition of a material standard (for example, the 2002 edition of the masonry design standard), and *ASCE-7-02* refers to a different edition of the same referenced standard (for example, the 1999 edition of the masonry design standard).

In the *IBC*, secondary standards that are cited within a referenced standard (for example, the masonry design standard *ACI 530-99* referenced within *ASCE 7-02*) are considered part of the code (Attachment B, Question 7). This allows *ASCE 7-02* to be used in a consistent manner, since the reference standards in *ASCE 7-02* are enforceable.

In contrast, NFPA states that in general, secondary and tertiary referenced documents are not considered part of the NFPA code. This renders *ASCE 7-02* unusable without substantial amendment, since the material standards referenced therein, which are vital to the use of the document, are not valid references. Further, NFPA shifts the burden of sorting out the enforceability of secondary and tertiary references onto the building official (Attachment A, response to Structural Question 6, page 17 of 22). This position is reiterated on Attachment A, page 18 of 22, 3rd paragraph, where NFPA, speaking of conflicts between the different editions of the

masonry design codes states "…as part of the review process, California will want to compare the seismic provisions of *ACI 530-99* with *ASCE 7-02*'s modifications to those of *ACI 530-02* to determine if there are conflicts and how best to deal with those conflicts."

The process of identifying and then resolving these types of conflicts will require a significant staff effort and a large number of California amendments. The problem is acute with *NFPA 5000*, since that code relies almost entirely on referenced publications, many of which are not written in concise or enforceable language. While there are also potential conflicts in the *IBC*, ICC has taken a position on precedence that provides a framework to resolve conflicts.

Amendment of Referenced Standards
Another fundamental difference between the ICC and NFPA deals with their approach to amending referenced standards during the model code development process. The *IBC* routinely amends referenced standards to eliminate conflicts or to meet performance objectives of the code (for example, see chapters 19 and 21 of the 2003 *IBC*). While conflicts still exist in the *IBC*, there is a mechanism for resolving conflicts between referenced standards when they are identified in the code development process.

In contrast, NFPA technical committees may take one of several approaches in response to the conflict (Attachment A, Structural Questions 3b, page 15 of 22; Question 5, page 16 of 22): they may decide to accept the "differences" (i.e. accept conflicting provisions), they may adjust criteria in *NFPA 5000* not to conflict (i.e. amend *NFPA 5000*), or they may submit a proposed change to the referenced publication in its' next revision cycle (i.e. accept conflicting provisions, but attempt to get the "owners" of the referenced publications to resolve the difficulty). The first approach builds a conflict into the code. The second approach, (where the conflict is resolved in *NFPA 5000*) appears to have been rarely employed in the structural chapters. The third approach could take years to resolve, and even then the publisher of the referenced document may choose not to make the change. As noted above, this leaves the task of identifying and correcting conflicts in the referenced standards to California (Attachment A, response to Structural Question 6 sub-bullet, page 18 of 22).

Compared to the *IBC*, it will take significantly more effort to amend the structural provisions of the *NFPA 5000* code to eliminate apparent conflicts between the code and referenced standards and provide a level of safety equivalent to that found in the 2001 *CBC*.

Code Format
Although the technical content of the *IBC* is different from the *CBC* in many areas, the format of the *IBC* is similar to the *CBC*. This will make it easier to move existing California amendments to the *IBC* and find appropriate places for new amendments.

The format of *NFPA 5000* is very different from the current *CBC*, which will make the task of amending it more difficult.

Another difference with the NFPA format that will increase the difficulty of writing amendments (and increase the confusion of using the code) is NFPA's policy regarding exceptions. The NFPA *Manual of Style* does not permit exceptions when it is possible to word the text as requirements. This sometimes results in confusing or contradictory code requirements. For example, *NFPA 5000* Section 19.1.1.4.1.2 states that "doors…shall normally be kept closed," and Section 19.1.1.4.1.3 says, "doors…shall be permitted to be held open if they meet the requirements of 19.2.2.2.7." On face value, the two sections seem to contradict each other, but the second is really an exception to the first.

In spite of their written policy severely limiting the use of exceptions, the *NFPA 5000* makes liberal use of exceptions in some chapters (See *NFPA 5000*, Chapter 15 Building Rehabilitation – 124 exceptions in 19 pages – and Chapter 16 Assembly Occupancies – 87 exceptions in 16 pages).

In response to our question regarding the policy on exceptions, (see Attachment A, page 9 of 22, question 10), NFPA stated, "NFPA staff has never encountered code text that cannot be effectively expressed in the form of requirements without the use of exceptions. There should never be a case where the 'exception' format is needed. Rather, there is a big need for careful code wording so as to avoid apparent conflicts."

Architectural Amendments
Since both the model codes seem to provide roughly equivalent levels of protection (with some exceptions), we believe they will require a comparable number of amendments to bring either code to the level of the current *CBC*. However, as noted above, the organization and style of *NFPA 5000* will make the amendment process more difficult.

A significant investment of time and energy will be required to update various OSHPD documents (PINs, CANs, FREER Manual, reference materials) to coordinate with either new code. The *IBC* will require the least time for this process, again because of the different format of *NFPA 5000*.

3. Ease of Use of the Code

Structural Issues

Both *NFPA 5000* and *IBC* reference documents that conflict with the requirements of *ASCE 7-02*.

In the case of the *IBC*, this includes the 2002 editions of three standards: the masonry design standard, *ACI 530-02*; the concrete design standard *ACI 318-02;* and the steel design standard, *AISC 341-02*. *ASCE 7-02* references and amends the 1999 editions of all three standards. The conflicts will require coordination efforts on the part of the enforcing agency.

The coordination effort required for the concrete and steel chapters (Chapters 19 and 22) of the *IBC* appears manageable, since the technical changes in the standards were minor, and the new editions are organized such that cross referencing is still relatively straight forward.

Chapter 21 of the *IBC* contains extensive provisions for masonry, but also references *ACI 530-02*. There have been substantial technical changes between the 1999 and 2002 editions of ACI 530 that must be reviewed. Our review of Chapter 21 indicates that in general, the references between *ACI 530-02* and *IBC* have been coordinated. This will somewhat ease the technical correlation effort.

Chapter 23 of the *IBC*, covering wood construction, is a comprehensive presentation of wood design. Compared to the 2001 *CBC*, the chapter is better organized, more concise, and very usable. *IBC* Chapter 23 contains requirements for both engineered and conventional construction.

NFPA 5000's handling of material standards is less effective than that of the *IBC*. *NFPA* 5000 also references the 2002 editions of steel, concrete, and masonry standards. As with the *IBC*, the steel and concrete chapters, while containing some conflicts, appear to be manageable.

The masonry design provisions present a greater challenge. Aside from the *ACI 530-02*, there is little in the way of masonry requirements provided. Further, unlike the IBC, there was no apparent effort to coordinate section references between the structural design and masonry standards.

The wood design chapter in *NFPA 5000* (Chapter 45) appears to be unenforceable as written. Chapter 45 contains references to material and design standards, and durability provisions. In the 2001 CBC, wood frame construction is designed using the Allowable Stress Design method. The corresponding provisions in *NFPA 5000* consist of a reference to the American Forest Products and Paper Association (AF&PA) *Allowable Stress Design (ASD) Manual for Engineered Wood Construction*.

The *ASD* manual referenced in *NFPA 5000* actually consists of six documents: the manual itself; the 2001 *National Design Specification (NDS)* for wood and a supplement volume to the *NDS*; a supplement volume covering lumber, glu-lam beams, poles, shear walls, and diaphragms; a supplement volume titled *Special Design Provisions for Wind and Seismic*; and a volume of guidelines covering I-joists, composites, trusses, and metal connectors. The ASD manual, which is the

primary referenced document, is an excellent resource for designers. It is not an enforceable code document. It contains examples, “featured projects” like a fast food restaurant, a warehouse, a reservoir cover, etc., and is more in the form of a textbook and guide than a building code. The 2001 *NDS* and *NDS* supplement are written in an enforceable style. The volume on special design for wind and seismic is written in somewhat enforceable style, but the requirements are not incorporated into the manual (the primary referenced document) in an enforceable manner, and it contains material that duplicates and some cases conflicts with the requirements in other volumes. No order of precedence is established amongst the various volumes.

For conventional construction provisions, *NFPA 5000* references the AF&PA *Wood Frame Construction Manual for One and Two Family Dwellings*, 2001 edition. Although it is an ANSI accredited standard, this two-volume set is also a mixture of enforceable and unenforceable language. The actual conventional construction requirements are scattered throughout the text, interspersed with narrative, design aids, etc. Further, the standard is narrowly scoped to apply only to one and two-family dwellings, and would therefore be inappropriate for use on hospital, licensed clinic, or skilled nursing facilities projects. Nothing in *NFPA 5000* covers conventional construction requirements for buildings under OSHPD’s jurisdiction.

There are other referenced publications in the wood chapter that do not appear to be enforceable, such as the AF&PA *Load and Resistance Factor Design (LRFD) Manual for Engineered Wood Construction* and the Southern Pine Council *Wood Foundations Design & Construction Guide.*

OSHPD adopts *CBC* Appendix Chapter 33 on site grading. There are corresponding provisions in Appendix J of the *IBC*. There are no corresponding provisions in *NFPA 5000*.

Training
The amount of training that will be necessary with the adoption of either model code was also considered. There are substantial technical changes in both codes, requiring a significant amount of training to become familiar these new provisions. From a structural perspective, both designers and building officials will require extensive training on all the referenced standards.

The IBC is organized along the same general lines as the 2001 *CBC*, so the format will be familiar to most users. *NFPA 5000* follows an entirely different format, and additional training will be required to become familiar with this new format. On the whole we have determined that *NFPA 5000* will require more extensive training to properly apply.

Performance-Based Design
NFPA 5000 includes provisions for performance-based design, which allows more flexibility for designers, but greatly increases the amount of work needed to design,

review and approve projects utilizing this method. The performance-based design requirements contain requirements that appear vague and unenforceable. For example, the criteria at the serviceability performance level include a structural requirement that "Structures shall not experience permanent deformation or deflection or deformation or deflection that is troubling to occupants or disruptive of building function." How would the phrase "troubling to occupants" be enforced? ICC has placed its requirements for performance-based design in a separate code document, which appears to be a much better approach.

"California Code"
The use of a code in California that is different from the one used in the other states is an issue that can significantly impact the cost of doing business in the state. Many owners and designers of health care facilities conduct business in more than one state. Using a building code in California that is radically different from the rest of the nation will impose a tremendous burden on building owners and their consultants. As of June 4, 2003, the *IBC* has been adopted by 26 states, and in various jurisdictions in 43 states. *NFPA 5000* has been adopted in only one city in the nation. If California adopts *NFPA 5000*, it will make the task of architects, engineers and hospitals that do business in California and other states much more difficult and costly.

Insufficient Development
Many building industry professionals feel the *NFPA 5000* code is not yet ready for widespread use. It is a brand new code, is presented in a format that has not been used for a modern building code, incorporates new concepts in building design, and has never been "tested" to demonstrate the effectiveness or usability of these new ideas.

One of our questions to both ICC and NFPA requested justification for the increased allowable heights and areas of buildings in both the *IBC* and *NFPA 5000*. In their response, NFPA states that the task group dealing with height and area requirements "set out to develop a new approach, grounded in scientific principles" rather than the "traditional height and area requirements…based primarily upon experience." At one point in the process, the task group "concluded there were still several unresolved issues surrounding this new approach…and it was simply not ready to be included in *NFPA 5000*. Instead, they substituted "heights and areas that are familiar to architects, engineers and code officials," that is, heights and areas virtually identical to those found in the *IBC*.

Support Services
With regard to support services (interpretations, evaluations, training), both organizations have promised to offer roughly equivalent support services. However, ICC has all of their support services in place already, and they are familiar to designers, contractors, and building officials, through their experiences with ICBO. NFPA has promised to provide the same services, but many of them are not yet in

place, or are in their infancy. Therefore, there is insufficient data available to be able to evaluate the NFPA support services. In addition, while NFPA has extensive experience supporting the standards, they have no experience providing support for a building code.

Conclusion

There has been much debate about the influence of the model code development process on the quality of the final code document. ICC has been developed through a "governmental consensus" process that is familiar to users of the *UBC*. In this process, all changes to the code are approved by building officials. *NFPA 5000* is developed using their ANSI accredited consensus process, whereby proposed changes are reviewed by Technical Committees composed of industry representatives, government enforcers, consumers, business persons and others. Proposed changes are then submitted to a vote of the NFPA membership at the annual meeting. Both methods can produce useful and effective documents, but NFPA's reliance on the ANSI process severely limits their ability to effectively coordinate the host of referenced publications contained in the *NFPA 5000* code, since amendment of one ANSI document by another ANSI document is strongly discouraged.

While ICC is a new organization, combining the ICBO, BOCA and SBCCI code organizations, it is in many ways familiar to those who have worked in the ICBO process. The support services and technical expertise of these three organizations has been merged into the ICC. The *IBC* is a compilation of the three organizations' model building codes. Many decades of code development have been incorporated into the *IBC*, and it has been used throughout the country in the 2000 edition.

NFPA has a long history of standards development. Their documents are used as the industry standard for many types of fire protection systems. *NFPA 5000* is a new building code. Although based largely on *NFPA 101 Life Safety Code*, it has never been used in practice for the design or construction of buildings.

Both model codes will require amendments to maintain current height, area, and fire sprinkler requirements, and will require amendments to prevent the reintroduction of non-ductile structural systems into California. In the case of *NFPA 5000*, conflicts and omissions exist in the structural provisions that make the document extremely difficult to use in its current form. If adopted, these conflicts will have to be resolved at both the state and local levels. Unfortunately, local jurisdictions can only amend the code for specific climactic, geographic and topographic reasons, and the state agencies have limited authority for only their statutory jurisdiction. This will leave the local jurisdictions with a building code that contains known conflicts and unenforceable language. Local amendments cannot be adopted at the state level. Therefore, design requirements will vary considerably throughout local jurisdictions statewide.

Based on our analysis, the *IBC* represents the best choice for buildings under OSHPD jurisdiction, and, in our opinion, for the State of California.

- The *IBC* will require much less work to amend. While *NFPA 5000* could be amended to be workable, we estimate it will require double the effort on the part of OSHPD, compared to adoption of the *IBC*.

- The *IBC* is a familiar format, and will be readily accepted and by design professionals and building officials. The task of retraining for a new code will be minimized.

- Health and Safety Code Section 18930 (a)(9) (the 9-point criteria) requires that the State Fire Marshal (SFM) review all regulations proposed by State Agencies to determine if the regulation promotes fire or panic safety. Selection of *NFPA 5000*, with its need for extensive amendments, will generate a significant increase in workload at the SFM. This will almost certainly delay SFM's response to the state agencies, which will in turn delay the code adoption cycle.

- Given the limitations imposed by the current fiscal environment in state government, OSHPD is not able to quickly and efficiently handle the volume of work that adopting *NFPA 5000* would create.

- Selection of *NFPA 5000* will result in delays in design and review of projects, as people struggle to become familiar with an entirely different code format.

- The IBC provides a better structure in which to use referenced standards, and allows referenced standards to be amended within the model code to eliminate conflicts.

- The mixture of enforceable and unenforceable language found in portions of the structural provisions of *NFPA 5000*, rather than providing design flexibility, will cause confusion and delays to designers and enforcers, as they struggle to determine exactly what the code requires.

- Because the wood chapter in *NFPA 5000* is unenforceable as written, an entire group of structures under OSHDP jurisdiction (single story Skilled Nursing Facilities and many licensed clinics) cannot be constructed using *NFPA 5000* as written. This will require writing an entirely new chapter for wood design.

- If California adopts *NFPA 5000*, California's design and construction communities will be placed at a severe economic disadvantage when pursuing work outside California. Also, many designers, contractors and building owners in other states may be reluctant to initiate work within California, since working with a totally different building code from the rest of the nation would create economic and logistic difficulties.

- Finally, and perhaps most importantly, adopting the *IBC* will fulfill the stated intentions of both ICC and NFPA, in having a single building code that is applicable throughout the United States. This will greatly reduce the burden and frustration of interstate design and construction.

RESPONSES TO OSHPD

Questions on the Fire and Life Safety Provisions

1. Application of a consistent code throughout the country is an important consideration. To date, what state and local jurisdictions have adopted the *NFPA 5000, Building Construction and Safety Code*?

A. NFPA 5000™, *Building Construction and Safety Code*™ is a recently-published document: issued in July 2002, published in September 2002, and available in October 2002. Even with its recent availability, NFPA 5000 is adopted in Pasadena, Texas. And many of NFPA 5000's key life safety provisions have been in use for years across the country. NFPA 5000 is substantially based on NFPA 101, *Life Safety Code*®, which was used as the base document in the drafting of NFPA 5000. The *Life Safety Code* has been extensively adopted at the state level (35 states adopt it in whole or in substantial part) and at the federal level (many federal agencies specifically adopt and enforce the *Life Safety Code*, including the Centers for Medicare and Medicaid Services, Department of Defense, General Services Administration, United States Postal Service, National Park Service, Department of Energy, National Air and Space Administration, etc).

California has long been the leading state in building regulatory advances, and is among the first considering adoption of NFPA 5000. Other states and jurisdictions are in the process of adopting or seriously considering adoption of NFPA 5000 as well, including the City of Phoenix and the State of New Mexico, among others. Also, it is important to note that while the number of model building codes has been reduced to two, the number of different state building codes remains at 50 because each state amends their adopted model code to suit their local needs.

2. What is the correct starting point or method for using *NFPA 5000* for building design and plan review? We have heard various methods presented, and many seem difficult to follow. Should designers and building officials:
    - Start in the occupancy chapters, and then proceed to the chapters for general requirements.
    - Start with the general chapters and move to the occupancy chapters, or
    - Proceed through the code from beginning to end?

A. As with the current California Building Code, there is no set process or path that always has to be followed. Recommended paths of use certainly depend on the purpose of the use.

Understanding the format of this occupancy-based code and the relationships between the different chapters is important for being able to successfully use the code. The format can be broken down as follows:

- Administrative (Chapters 1-5).
- Core Fire & Life Safety (Chapters 6-15).
- Occupancy (Chapters 16-34).
- Structural (Chapters 35-40).
- Materials (Chapters 41-48).
- Building Systems (Chapters 49-55).
- Annex Materials.

Administrative Chapters: Chapter 1 establishes the administrative provisions for the enforcing agency, including inspection and plan review provisions. Chapter 2 lists the standards that are referenced in various sections of the code. Chapter 3 catalogues the definitions utilized throughout the code. Chapter 4 primarily establishes the goals for the code, which are satisfied through enforcement of the prescriptive code. These goals are also necessary in determining equivalency of alternate designs, materials, and methods of construction. Chapter 5 establishes a methodology for determining equivalency for alternate designs, materials, and methods of construction, when alternates are employed.

Core Fire & Life Safety Chapters: Regulations in these chapters set forth the general fire and life safety requirements, such as types of construction, allowable heights/areas, fire resistive construction, means of egress, accessibility, etc. These requirements generally apply, unless specifically addressed in the occupancy chapters. Chapter 6, Classification of Occupancies, is instrumental in the use of the code because it establishes occupancy based on character or use of the facility.

Occupancy Chapters: Each occupancy is regulated by a specific chapter, which provides overall direction for regulation of that particular occupancy. Generally, applicability of the core fire and life safety chapters is established. Each occupancy chapter is formatted similarly and establishes:

- General requirements.
- Means of egress provisions.
- Protection (alarms, sprinklers, etc.) requirements.
- Building services regulations.
- Special occupancy provisions.
- Operating features requirements.

Structural Chapters: These provisions generally apply independent of the occupancy of the building. Chapter 35 provides the general structural design provisions and load requirements.

Materials Chapters: Each chapter addresses regulation of the specified structural material independent of the occupancy of the building.

Building Systems: Each chapter establishes regulations for the specified building system. Many are references to other *Comprehensive Consensus Codes*™, such as the

National Electrical Code®, or the *Uniform Plumbing Code™* or *Uniform Mechanical Code™*.

For plan review and design, the approach outlined below is one example of how a designer or plan reviewer can effectively move thorough the requirements of the code.

1. Is this a new building or renovation/repair to an existing building? See Chapter 15 for regulations affecting existing buildings undergoing construction.

2. Establish if prescriptive-based approach will be used or performance-based approach will be used (Chapter 4).

3. Determine the occupancy classification of the structure. Select occupancy classification(s) and definitions that most accurately fit the use of the building (Chapter 6).

4. Review and check the detailed occupancy requirements for charging language for the fundamental requirements in the core fire and life safety chapters. Any modifications of the fundamental requirements, charging language requires compliance with some or all parts of the core chapters (Chapters 16-30).

5. Determine the actual physical properties of building:

    (a) Determine the building area for each floor (Area definition - Chapter 3).
    (b) Determine the grade elevation for building (Grade definition - Chapter 3).
    (c) Determine the building height in feet above grade (Height definition – Chapter 3).
    (d) Determine the building height in stories (Story definition – Chapter 3).

6. Determine the minimum type of construction necessary for the proposed occupancy by:

    (a) Determining maximum allowable heights and floor areas based on Types of Construction and Occupancy Classification (Table 7.4.1).
    (b) Check allowable height and area increases permitted (Chapter 7).

7. Check detailed construction requirements including, but not limited to:

    (a) Fire protection of structural members (Chapter 7 and Table 7.2.2).
    (b) Fire protection requirements (Chapter 8).
    (c) Means of egress requirements (Chapter 11).
    (d) Elevators (Chapter 54).
    (e) Sprinklers, standpipes, and alarm systems (Chapter 55).
    (f) Use of combustible materials - interior (Chapter 10).
    (g) Roof coverings (Chapter 38).
    (h) Light, ventilation (Chapters 49 and 50).

(i) Sanitation (Chapter 53).

8. Review structural design considerations and material provisions based on the type of material utilized.

9. Check other requirements as necessary.

These steps are naturally varied in sequence by individual preferences; however, the first three are standard steps that should be followed in proper order to assist in design or review of buildings.

3. *NFPA 5000* allows heights and areas that are much larger than what has historically been allowed in the UBC and CBC. What justification was provided to increase the allowable heights and areas so drastically?

A. For the first draft of NFPA 5000, the Structures & Construction Technical Committee formed a Task Group to deal directly with the contentious issue of allowable height and area requirements. Over the course of the code cycle, the Task Group reviewed a substantial number of resource documents on this topic. From this extensive review, the group concluded that traditional height and area requirements are based primarily upon experience and not scientifically derived. So the Task Group set out to develop a new approach, grounded in scientific principles, which was based upon the concept of fire compartments. This new approach was fleshed out and printed in the ROP draft.

However, by the time of the ROC, the Task Group concluded that there were still several unresolved issues surrounding this new approach for regulating allowable heights and areas, and it was simply not ready to be included in NFPA 5000. So at the ROC meeting, the Task Group recommended to the Structures & Construction Technical Committee that NFPA 5000 include an approach based upon heights and areas that are familiar to architects, engineers, and code officials. The numbers found in NFPA 5000 Table 7.4.1 reflect the current provisions in model building codes on the topic and include numbers that are consistent with other NFPA documents, including NFPA 101, *Life Safety Code*.

It is worth noting that the Technical Committee responsible for Chapter 7 is still committed to developing a new scientific approach to allowable height and area requirements based upon fire compartments.

4. Allowable heights and areas are much larger for ambulatory health care facilities than even the IBC allows (and far exceed the limits in the CBC). What justification is given for such large and tall buildings where patients are rendered incapable of self-preservation?

A. The heights and areas limitations for ambulatory health care (AHC) occupancies are nearly identical to those for business occupancies, with the exception of the height limitations for nonsprinklered buildings of the unprotected construction Type II (000),

Type III (200), and Type V (000). This is based on the premise that AHC occupants utilize a protection package that starts with the requirements for a business occupancy and then adds extra protection requirements, such as subdivision of building space via smoke barriers. The smoke barriers create smoke compartments that serve as refuge areas allowing patients to wait-out the emergency, be "revived" to ambulatory status, or otherwise prepared for evacuation by staff.

The number of patients rendered incapable of self-preservation in an ambulatory health care occupancy typically does not outnumber the staff available to help with patient movement. This approximate one-to-one ratio is not mandated by the code, but is provided for functional purposes. A patient who is administered general anesthesia is generally surrounded by an anesthesiologist, another specialist such as a surgeon, and one or more nurses. Recovery rooms have similar high staffing levels. Thus, the height and area limitations for AHC occupancies are justified in being nearly identical to those for business occupancies. Where AHC height limitations are stricter than those for business occupancies [that is, for nonsprinklered buildings of the unprotected construction Type II (000), Type III (200), and Type V (000)], there is a recognition that with non-rated floors, non-rated structural supports, and no sprinklers, the structural integrity of the building is not assured for the time needed to evacuate nonambulatory patients.

5. *NFPA 5000* offers substantial "trade-offs" in construction for automatic sprinkler systems. It is very likely that an earthquake may render such sprinkler systems inoperative in areas of high seismic activity. Additionally, sprinkler systems may be shut off for maintenance or service. How are buildings protected against fire, where sprinkler systems are used for trade-offs and then fail to operate when needed?

A. Over the past five years, the trend in all model building codes has been to allow reductions in some required protection features where automatic fire sprinklers are provided. Sprinkler systems provided for purposes of complying with the construction alternatives offered by NFPA 5000 must be installed per NFPA 13, *Standard for the Installation of Sprinkler Systems*, which includes a host of seismic design and bracing requirements. In areas of high seismic activity, if a sprinkler system is subject to damage, other construction features such as fire barriers are also subject to damage. Likewise, earthquake damage does not immediately translate into a fire emergency or the need to evacuate.

Let's use a hospital as an example. If sprinkler systems are damaged in an earthquake, hospital administrators might decide that the evacuation and relocation of patients to another facility is needed because the defend-in-place strategy that relied on sprinkler protection can no longer be assured to work. Similarly, if a fire barrier (for example, the smoke barrier that creates a minimum of two smoke compartments on each patient floor) is damaged by earthquake, hospital administrators might decide that the evacuation and relocation of patients to another facility is needed because the defend-in-place strategy that relied on fire/smoke barriers can no longer be assured to work.

On the subject of sprinkler systems being shut off, there are two issues: (1) inadvertent or unauthorized valve closure, and (2) maintenance or service shut downs.

Inadvertent or unauthorized shutoffs are addressed by the requirement that sprinkler systems must be supervised. Supervision, per NFPA 5000, must be electrical supervision so that appropriate notification is provided automatically any time a valve is closed. Such supervisory signals must sound and be displayed either at a location within the protected building that is constantly attended by qualified personnel or at an approved, remotely located receiving facility.

NFPA 5000 also addresses the issue of sprinkler systems being shut off for maintenance. For example, in the high-rise building provisions, 33.2.2.2 and 55.3.1.6 require that a sprinkler control valve be provided on each floor. This multiple valve arrangement permits for the sprinkler system to be shut off only on the floor where maintenance/service is to be performed while all other floors remain protected by sprinklers.

NFPA 5000 is part a coordinated set of codes and standards for the built environment. It relies on the adoption and enforcement of a fire prevention code such as NFPA 1, *Uniform Fire Code*™. The fire code has additional requirements addressing the number of hours a sprinkler system can be out of service before a fire watch must be provided or the building must be evacuated.

6. The NFPA *Manual of Style* includes "reasonable" in the list of "possible unenforceable and vague terms," which "shall not be used within the body of codes or standards" if the language is unenforceable or vague. In light of this requirement, and the fact that virtually all of Chapter 4 of *NFPA 5000* uses phrases such as a "reasonable level of safety," "does not unreasonably affect…," "provide reasonable assurance," and "consistent with reasonable expectations," how can a building official apply and enforce Chapter 4 of *NFPA 5000*?

A. Section 4.1 of NFPA 5000 establishes the goals and objectives for the prescriptive code. It is an integral and important part of the overall document, not only for the prescriptive code but also for the performance-based design options. Yet, Section 4.1 is not intended to be directly and independently enforced. In fact, compliance with the prescriptive requirements of the code satisfies the goals and objectives set forth in Section 4.1.

More specifically, the goals and objectives in NFPA 5000 serve as:

(a) The bases for which the NFPA technical committees developed the prescriptive-based requirements of Chapter 1 through Chapter 4 and Chapter 6 through Chapter 55 of the code. The prescriptive requirements inherently reflect the goals and objectives of section 4.1. The vast majority of building projects will use the prescriptive option, so, again, Section 4.1 is not meant to be directly and independently enforced.

(b) The bases for which the NFPA technical committees developed the performance criteria of Section 5.2 for use with a performance-based design in accordance with Chapter 5. Performance-based designs will typically be used only for construction projects utilizing alternate design, materials, or methods of construction. The Authority Having Jurisdiction (AHJ) will typically rely on an approved, independent third party reviewer, as permitted by 5.1.3. So, once again, Section 4.1 is not meant to be directly and independently enforced.

7. What is the correct occupant load factor for assemblies?

- Section 16.1.6 states that occupant load is to be determined using the load factors in Table 11.3.1.2. This table provides different load factors for different uses, ranging from 3 sf per person to 100 sf per person. The next sentence in section 16.1.6 says that the occupant load shall not exceed one person in 5 sf in areas not in excess of 10,000 sf, and one person in 7 sf in areas in excess of 10,000 sf.
- At the NFPA presentation to the state agencies, when I asked how to apply these seemingly different requirements within the same code section, the presenter told the group that the different requirements give the designer more options in designing the building. Rather than options, this seems to add confusion and inconsistency.

A. Note that the first column of Table 11.3.1.2, Occupant Load Factor, is titled "Use" and not "Occupancy." It is possible to have an assembly use that is not an assembly occupancy. For example, if a meeting room for approximately 20 persons is located in an office building (that is, in a business occupancy), the meeting room would be an assembly use and it would be part of the business occupancy. The occupant load of the meeting room would be calculated using either the 7 ft^2 or 15 ft^2 per person occupant load factor from Table 11.3.1.2. Because of the presence of tables and chairs, the 15 ft^2 per person factor for "less-concentrated assembly use" is chosen for use in calculating the occupant load.

Table 11.3.1.2 does not offer the 3 ft^2 per person occupant load factor for an assembly use. The table offers the range of 7 ft^2 through 100 ft^2 per person. The 3 ft^2 per person occupant load factor is for use only for a specialized form of waiting space in an assembly occupancy. The code user learns this, not from Table 11.3.1.2, but from going to the assembly chapter and reading 16.1.6.1. Further, by going to Chapter 16 for an assembly occupancy, the code user learns from 16.1.6 about the maximum packing densities via a set of 5 ft^2 and 7 ft^2 rules.

So, the intent of Table 11.3.1.2 is to provide the generalized occupant load factors for various uses; and the intent of 16.1.6 and 16.1.6.1 is to provide unique, specialized guidance on occupant loads in assembly occupancies. This is the typical format used in NFPA 5000 where the means of egress chapter (Chapter 11) provides the general egress information, and the occupancy chapters (for example, Chapter 16 for assembly) provide the specialized criteria and deviations from the general provisions.

In piecing together the generalized data in Table 11.3.1.2 and the specialized provisions of 16.1.6 and 16.1.6.1, the code user dealing with an assembly occupancy learns:

(a) Use 7 ft^2 per person where furniture is almost nonexistent, such as for a stand-up reception or a dance floor; this is referred to as "concentrated use" in Table 11.3.1.2.

(b) Use 15 ft^2 per person where there is furniture occupying part of the space, such as for a meeting room or dining area; this is referred to as "less-concentrated use" in Table 11.3.1.2.

(c) Increases in occupant load are permitted over the number of persons calculated using 7 ft^2 and 15 ft^2 per person (see 11.3.1.3 through 11.3.1.3.2 and the second sentence of 16.1.6). Provided the area does not exceed 10,000 ft^2, patrons of the assembly occupancy are permitted to be "packed-in" at the rate of 1 person per 5 ft^2. In areas greater than 10,000 ft^2, the maximum packing density permitted is 1 person per 7 ft^2. This is because the patrons in the larger venue will tend to move toward the attraction (for example, toward the band on the stage at the front of the room). Such movement will leave the back of the room sparsely occupied and the front of the room more densely occupied, even though the average for the room is 7 ft^2 per person. In smaller venues, 5 ft^2 per person is permitted because the occupant loading density remains fairly constant throughout the room.

(d) For specialized waiting spaces (for example, the space in a movie theater lobby where ticket holders are corralled by ropes supported on stanchion posts), the occupant load is permitted to be set at 1 person per 3 ft^2. The 3 ft^2 per person occupant load factor is not for use where patrons belly-up to the bar 3-deep waiting to be served a beverage.

The numerous provisions for occupant load calculations in assembly occupancies are necessary. It would be unfair to the venue operator to establish just one option such as 15 ft^2 per person when additional patrons can be safely accommodated. Similarly, it would be unfair to the AHJ if all assembly occupancies were permitted to pack patrons into an area at the rate of 1 person per 5 ft^2 when safety cannot be assured. Some facilities can safely accommodate patrons at 5 ft^2 per person and others cannot. The detailed criteria of 16.1.6 regulate the subject fairly.

8. What is the correct application of the height increase allowed for residential sprinklers in section 7.5.2? It is not clear if section 7.5.2 is an exception to section 7.4.1 (allowing an NFPA 13R system for residential occupancies instead of the NFPA 13 system required in 7.4.1), or if this is an additional increase to the sprinklered heights shown in Table 7.4.1 for any occupancy, or something else.

   Also, depending on the type of construction, the maximum height in the table for non-sprinklered buildings exceeds the allowable heights in section 7.5.2 for residential buildings sprinklered with a 13R system (the allowable height for a non-sprinklered building exceeds the allowable height for a 13R sprinklered building). Not until one

looks at the specific application of NFPA 13R does one find that it can only be used in buildings not exceeding four stories in height. The four-story limit specified in section 7.5.2 is actually not a limitation of the residential occupancy, but rather of the 13R sprinkler system that may be used in the building.

A. NFPA 5000, Table 7.4.1, allows an increase in both the maximum building height and allowable number of stories above grade when a building is protected throughout with an approved, electronically supervised sprinkler system in accordance NFPA 13 (as specified in Section 55.3.1.1(1)).

In addition to these requirements in Table 7.4.1, Section 7.5.2 limits the user to a 20 ft increase in the overall height and a 1-story increase if a NFPA 13R system is substituted for a NFPA 13 system. Section 7.5.2 only allows a NFPA 13R system to be used if the overall building height does not exceed 60 ft and the maximum number of stories does not exceed four stories.

9. Does the area increase for sprinklers (section 7.6.2.2) apply to building areas in Table 7.4.1 where the occupancy is not permitted in non-sprinklered buildings?

A. NFPA 5000, Section 7.6.2.2, allows an increase in the allowable area per floor for sprinklered buildings. This option applies to any building that is protected by an approved, electrically supervised automatic sprinkler system installed in accordance with NFPA 13.

In the situation where a particular occupancy is required to be sprinklered, the designer is still permitted to utilize this automatic sprinkler increase for the building, unless it is specifically prohibited by the occupancy- or use-specific chapter (NFPA 5000, Chapters 16-34).

10. The NFPA *Manual of Style* requires that exceptions be worded as requirements whenever possible. Why has the exception format not been retained when the resulting text is awkward, confusing or contradictory? For example, section 19.1.1.4.1.2 states that "doors…shall normally be kept closed," and section 19.1.1.4.1.3 states that "doors…shall be permitted to be held open if they meet the requirements of 19.2.2.2.7." The two sections say opposite things, when one is actually an exception to the other.

A. NFPA staff has never encountered code text that cannot be effectively expressed in the form of requirements without the use of exceptions. There should never be a case where the "exception" format is needed. Rather, there is a big need for careful code wording so as to avoid apparent conflicts. The wording of 19.1.1.4.1.2 and 19.1.1.4.1.3, as questioned, is not contradictory, it is complimentary as an exception.

Differing formats is a matter of preference.

11. Does NFPA anticipate that the "weighted width" formula in the frontage increase calculation will be widely used? With the summation function, the formula will be virtually unusable by architects and building officials without extensive education and recent experience in higher math skills.

A. NFPA 5000, Section 7.6, allows the floor areas specified in Table 7.4.1 to be increased to account for frontage and automatic sprinkler protection. The equation for the frontage increase includes a variable, W_w, which contains a summation function, ?.

Although this area increase is optional for the designer, this formula will be used in many cases to increase the building's allowable area. It is anticipated that most architects and building officials are equipped with the education to utilize this algebraic equation. However, along with this code, it is anticipated that there will be tools, such as handbooks and computer programs, available to assist users in the proper application of this equation.

It may also be worth noting that the use of this algebraic symbol is a growing trend in codes and standards that deal with additive equations of varying length. For example, this summation function is utilized in many sections of the current California Building Code, including sections 1630.2.2, 1630.5, and 1910.11.4.2. Additionally, the summation symbol is used extensively in standards referenced by all model codes, such as ASCE 7-02.

12. Section 19.2.2.2.4(1) permits door locking arrangements if keys are carried by staff, with no limit to the number of locks in the egress path. 19.2.2.2.4(2) permits delayed-egress locks, but no more than one such device is permitted in the egress path. Why are any number of manual locks permitted, and only one delayed-egress lock, when delayed-egress locks have the added protection features of section 11.2.1.6.1?

A. Chapter 19, Health Care Occupancies, was written with full knowledge that staff is present in sufficient numbers, for day-to-day functional purposes, to assure that NFPA 5000 requirements that rely on staff assistance can be effectively relied upon as part of the overall protection package. Doors are permitted to be locked for the clinical needs of the patients. For example, to prevent Alzheimer's patients from wandering away from their unit and encountering dangers such as falls down stairs or exposure to harsh outdoor weather conditions. Thus, the nursing staff is permitted to be responsible for unlocking multiple doors; staff does this while accompanying patients. Often such unlocking of doors is done to get to an adjacent smoke compartment as part of the defend-in-place concept employed. Contrast that with the delayed egress lock that will find its main application in portions of the building where there are fewer "locked-in" patients. Ambulatory patients, general staff, and visitors can be expected to encounter the delayed egress lock without having nursing staff at their side. Expecting someone without trained nursing staff at their side to be willing to wait multiple times for delayed egress locks to unlock is not reasonable.

13. Section 19.2.5.9 does not permit corridors to pass through any intervening rooms or spaces, other than corridors or lobbies. Section 19.3.6.1 permits many different rooms, areas and spaces to be open to the corridor. How does one reconcile these two sections?

A. The provisions of 19.2.5.9 address the same concept that 11.5.1.2 does, only 11.5.1.2 does it better because it states "…other than corridors, lobbies, and other spaces permitted to be open to the corridor." The concept is one of requiring access to an exit directly from the exit access corridor without having to enter some other use space. The thought is that there is no assurance of proper control over those other spaces, so having to pass through them does not assure safe egress. The health care technical committee will probably be in favor of modifying the wording of 19.2.5.9 to be identical to that in 11.5.1.2. The health care technical committee developed the wording of 19.2.5.9 long before the subject was addressed in the Chapter 11 egress provisions. The committee felt the language has been adequate historically because of the operative words "(not) pass through." Although 19.3.6.1 permits areas to be open to the corridor, egress cannot be through such areas. See, for example, 19.3.6.1(1)(d), 19.3.6.1(2)(c), and 19.3.6.1(5)(c), which all use the words "The area/space does not obstruct access to required exits," which is meant to require such spaces to be off to the side of the corridor.

14. Section 19.3.6.1(1) permits spaces of unlimited area and unspecified use to be open to the corridor. Apparently, the only limitations are that the spaces cannot be used for patient sleeping or treatment or hazardous areas, and they are protected with a smoke detection system. Does this permit a hospital without walls, except for patient sleeping and treatment rooms, hazardous areas and smoke barriers?

A. The space that is open to the corridor cannot be used for patient sleeping, treatment, or any use that creates a hazardous area (for example, storage, mechanical space, trash collection, soiled linen, laundries, laboratories). That leaves very few uses that would be compatible with running an effective health care occupancy. For example, although it would not be prohibited to place the accounting office in a space open to the corridor, functional needs dictate that the accounting department will not reside in spaces left open to a corridor within a patient sleeping unit. So, the question is purely academic; a hospital without walls (except for patient sleeping room walls, treatment room walls, hazardous area walls, and smoke barrier walls) just won't happen. The spaces permitted to be left open to the corridor will continue to be the traditional areas such as waiting spaces, solariums, and patient activity spaces.

15. Why is "Nonsprinklered Existing Building Rehabilitation" (Section 19.4.3) in chapter 19, and not in chapter 15? The use and application of Chapter 15, Building Rehabilitation, is extremely confusing.
16. The path to find information or requirements is often very confusing. Section 19.1.1.1.3 refers to chapter 15 for repairs, etc. Section 15.5.1.2.3, refers to section 15.6.2.5.2.3, which refers to section 19.1.1.4.3 for sprinkler requirements. Section 19.4.3.1 refers to projects exempted by section 15.5.1.2.3 from the sprinkler

requirements of section 19.1.1.4.3, which must comply with the requirements of sections 19.4.3.2 through 19.4.3.6, etc.

A -15 and 16. The requirements of Chapter 19, Health Care Occupancies, are predicated on the presence of a fully sprinklered building. Where rehabilitation projects are of a small enough magnitude to exempt the smoke compartment undergoing the rehabilitation from being sprinklered, it is important to steer the code user directly to subsection 19.4.3 without leading them to Chapter 15. Otherwise, the code user will attempt to use the requirements of 19.1 through 19.4.2 without modification, and that will lead to an inadequate level of protection for a nonsprinklered smoke compartment. The requirements of 19.4.3 introduce extras that are needed if there are no sprinklers, but not needed if sprinklers are installed. The wording in Chapter 15 serves as a cross reference so Chapters 19 and 15 do not conflict. It might be confusing at first, but in application it works and there are no conflicts.

There might be ways to simplify the roadmap of provisions for future editions of the code. The technical committees involved thought it was imperative that the first edition of NFPA 5000 offer the unique options presented by Chapter 15, Building Rehabilitation. The presence of Chapter 15 shows how the NFPA documents are state-of the-art and responsive to user needs. Had Chapter 15 not been included in the 2003 edition, there would be no incentive for the adaptive reuse of existing buildings. Chapter 15 is offered for use with all occupancies. Health care occupancies are unique in that spaces are rehabilitated on an ongoing or never-ending basis.

Questions on the Structural Provisions

1. Describe the acceptance criteria used to select referenced publications for the code.
    a. Are there standards for style and format?
    b. What criteria are used to determine enforceability of the referenced publications?
    c. Is the participation of enforcement agencies in the development of the referenced publications a consideration?
    d. How are the issues of referenced publication cost, availability, and policies on updates and errata considered?

A -1a. and 1b. Acceptance and incorporation of referenced codes, standards, and other documents is strictly governed by the NFPA Regulation Governing Committee Projects (RGCP). Section 3-3.7, which is on page 52 of the 2003 NFPA Directory, establishes the criteria.

The documents that are referenced in the main body of the code: 1) must use mandatory language (see 3-3.7.1.1); 2) must typically be available for review at NFPA headquarters (see 3-3.7.1.1); 3) must be developed using an open process, which is generally, but not exclusively the American National Standards Institute (ANSI)-accredited process (see 3-

3.7.1.2); 4) may be allowed to not meet the criteria for open process when other choices are not available (see 3-3.7.1.3).

NFPA technical committees are charged with making the determination whether a particular referenced code or standard needs to be included in the document and complies with the RGCP. Design and construction criteria are so complex and broad today, that there is no way to capture all of the relevant information in a few sentences within a model building code. Generally speaking, NFPA technical committees would only reference other documents that were consistent with one or more of the stated goals and objectives in Chapter 4 of NFPA 5000. Since availability of the referenced document is a crucial concern in the NFPA process, NFPA technical committees almost always reference the edition of the document that will be available when the new NFPA code is issued.

A - 1c. Participation by a particular entity, such as code enforcement agencies, is desirable, but it is not a specific condition of review or acceptance for a referenced document. As noted in 1a and 1b, NFPA regulations stipulate a preference for referenced documents that are developed using an open process. It is important that no interests such as code enforcers be excluded from participating in the process of developing a referenced standard. In fact, the NFPA RGCP gives precedence to an open, voluntary consensus process, such as the ANSI-accredited processes, so that all interests have the opportunity for equal participation throughout the process. The category of "Regulators" is a standing interest category in the ANSI procedures.

A - 1d. All model codes use referenced standards, and all model codes indicate that the referenced standards are considered part of the model code. NFPA 5000 references 428 documents and NFPA 1 references 210 documents. The total number of references for the NFPA model building and fire codes is 638, which is considerably fewer than the number of referenced standards for the three ICC codes.

Specifically, the IBC references 518 documents, the IRC references 542 documents, and the IFC references 182 documents. Because adoption of the IBC also requires adoption of the IRC, the total number of references for the ICC codes is 1242. Agencies or jurisdictions using the ICC codes will have to purchase all of these documents from the ICC. And not only will jurisdictions have to purchase a building and fire code, but also a residential code and its referenced standards. This additional ICC code also forces jurisdictions to purchase additional training, certification, and resource material.

In order to be considered by NFPA for referencing, the NFPA technical committees make the following determinations:

- Does the document include information that is relevant to the subject at hand?
- Does it make the code better?
- Does it improve upon the level of safety?
- Does it provide guidance that will enhance building design and performance?

Since availability of the referenced document is a crucial concern in the NFPA process, technical committees reference the edition of the document that will be available when the next edition of the NFPA code is issued. The policy on updates to the referenced document is not a standing criteria. Technical committees will usually be made aware of the typical update to the document as a part of the review of the referenced standard.

2. Describe the methods used to review referenced publications cited in the structural chapters, prior to adoption into the code.
    a. What process is used to evaluate and amend the referenced publications?
    b. How many individuals review each publication?
    c. How much time is allotted to the effort?
    d. Is there a written public record of the findings and recommendations of the reviewers?

A - 2a. NFPA Regulations Governing Committee Projects, Section 4, clearly outlines the process of developing and revising documents. Within the context of this process, both the Structures and Construction Technical Committee and the Building Materials Technical Committee formed Task Groups for each of the structural and material chapters in order to recommend requirements to the technical committees on each specific topic. Parts of the Task Groups' work included reviewing and evaluating appropriate reference documents. For guidance in this particular area, the Task Groups turned to NFPA Regulations Governing Committee Projects, Section 3-3.7, which dictates the acceptance criteria for outside references codes, standards, and other documents.

In general, NFPA discourages technical committees from amending or revising the work of other ANSI committees. These specialized committees tend to have substantial expertise in a very narrow topic, and, as such, the NFPA 5000 technical committees, whose knowledge base is broader, need to respect this expertise. That said, however, the NFPA 5000 technical committees have the opportunity to amend the referenced document through the NFPA code development process. In addition, technical committees are encouraged to submit modifications correcting the problem to the document in question. As such, NFPA attempts to be directly involved in the development of other key referenced documents, or encourage those involved with other key documents to be involved in the development of the referencing NFPA code.

A - 2b. The Task Groups charged with reviewing each of the structural and material chapters varied in size considerably, from less than a handful to well over a dozen, depending upon the complexity of the topic. The individuals assigned to the Task Groups are recorded in the Technical Committee Meeting Minutes. Copies of the meeting minutes from the pre-ROP, ROP, and ROC meetings of both the Structures & Construction Technical Committee and the Building Materials Technical Committee are public record and available for your review.

Please keep in mind that each of the Task Groups presented their recommendations to the responsible technical committee. It was then the full technical committee that acted upon the Task Groups' recommendations. Those actions are recorded in the ROP and ROC.

A - 2c. Because this review took place within the confines of the NFPA 5000 code cycle, it was completed inside the standard 24 month cycle.

A - 2d. The meeting minutes cited in the answer to Question 2b are public record and contain summaries of the Task Group reports. In addition, the ROP and ROC, which are also part of public record, contain further public documentation of the process.

3. Identify and describe the duties of the individuals responsible for coordinating referenced publications.
    a. How is the scope of the referenced publications (as applied in the code) determined?
    b. What is the process for identifying and remedying conflicts?
    c. How many individuals review the referenced publications for potential conflicts?
    d. What are the criteria used to judge compatibility of the referenced publications with other structural requirements of the code?

A - 3a. NFPA technical committees have a wide realm of responsibility for determining what is and is not appropriate to reference in the code. The technical committees establish what is relevant to the code requirement. In some cases, the technical committees utilize task groups to review and recommend referenced documents and their applicability within the main code. In addition to verifying that it meets the criteria of the NFPA regulations, the technical committees must judge if the referenced document is technically consistent with the goals and objectives of the code (See NFPA 5000: Chapter 4).

A - 3b. NFPA 5000 Sections 1.3.2 and 6.4.1.2 delineate the authority for precedence. Any conflicts between the code and referenced documents default to the requirements of the code. NFPA technical committees are composed of technical experts who are normally intimately aware of the requirements of the referenced documents. Differences between the referenced document and NFPA 5000 are usually identified and the technical committee will then decide on how to proceed. That is, whether to knowingly move forward with a difference, to adjust the criteria in NFPA 5000 so as not to conflict (if possible) with the referenced document, or to develop an appropriate revision to the companion referenced document to be submitted to the companion document's development committees for consideration during its next code development cycle.

A - 3c. Besides task groups that may review the referenced document, the technical committee has responsibility for reviewing the recommendation from the task group to make a formal recommendation. In the NFPA Building Code project, a technical correlating committee also reviews the work of the 16 technical committees. All told,

there are approximately 50 to 60 members of task groups, technical committees, and the technical correlating committee who have an opportunity to review the selection of the referenced publications. Additionally, many other people participate in the development process. They, too, have the opportunity to review the document and comment.

A - 3d. Once again, the task groups, technical committees, and the technical correlating committee review, recommend, and judge compatibility of referenced standards with the provisions of the code.

From a structural point of view, the national trend is the development of a system that revolves around the National Earthquake Hazard Reduction Program (NEHRP). The expert or parent document for structural design that complies with this national program is ASCE 7, *Minimum Design Loads for Buildings and Other Structures*, 2002. NFPA committees elected to take the approach that ASCE-7 should be used as the basis for all structural design issues. Amendments to ASCE-7 were determined to be not in the best interest of codes, authorities having jurisdiction, or of designers, as many conflicts would be created. In addition, ASCE-7 is largely coordinated with many of the material standards (ACI, AF&PA, and AISI) as well as with criteria from FEMA. The NFPA technical committees referenced ASCE-7 without amendment, thus bringing to bear a set of coordinated structural requirements from another ANSI-accredited organization.

4. Reference publications produced by the steel, concrete, masonry, and timber industries are valuable resources. However, they also reflect the bias of the industry group, and may include structural systems or methods of construction suitable only for areas of low seismic risk. What processes are used to screen the referenced publications to ensure systems of low ductility are not constructed in regions of high seismic risk?

A. The same process outlined in the answer to Question 2 of this section would be utilized to screen the referenced publications to ensure systems of low ductility are not constructed in regions of high seismic risk.

5. *NFPA 5000* contains numerous references to guidelines and handbooks. These documents may not be written in enforceable language, and often contain information that may be in direct conflict with other reference standards, yet they are accorded the full weight of code language, since Section 2.1 states that the documents or portions thereof referenced within the code shall be considered part of the requirements of the code. When conflicts arise, how would a Building Official determine what language takes precedence?

A. As indicated in the answer to question 3b, NFPA 5000, Sections 1.3.2 and 6.4.1.2, delineate the authority for precedence. Any conflicts between the code and referenced documents default to the requirements of the code. NFPA technical committees are composed of technical experts who are normally intimately aware of the requirements of the referenced documents. Differences between the referenced document and NFPA

5000 are usually identified and the NFPA technical committees will then decide on how to proceed. That is, whether to knowingly move forward with a difference, to adjust the criteria in NFPA 5000 so as not to conflict (if possible) with the referenced document, or to develop an appropriate revision to the companion referenced document to be submitted to the companion document's development committees for consideration during its next code development cycle.

6. If a referenced publication in turn references other documents, are these documents also considered to be a part of the building code? If not how is the referenced publication to be enforced?

    - *NFPA 5000* sometimes references different editions of material standards than those in ASCE 7-02. For example, NFPA 5000 references ACI 530-02 for masonry design, while ASCE 7-02 is based on ACI 530-99. Similarly, *NFPA 5000* references AISC Seismic Provisions for Structural Steel Buildings 2002, while ASCE 7-02 is based on AISC Seismic 97, with Supplement 2. Where there are technical differences, which edition of the material reference is enforced? If a version of a standard different from that specified in ASCE 7-02 is enforced, what steps have been taken to ensure that compatibility in design assumptions between ASCE 7 and the material standard is maintained?

A. In general, secondary and tertiary references in the referenced documents are not considered to be a part of the NFPA code, thus do not need to comply with the NFPA Rules Governing Committee Projects. It is really a decision of the jurisdiction as to how far they may want to drill down into secondary and tertiary referenced publications. NFPA 5000: 2.1 states "The documents or portions thereof listed in this chapter are referenced within this Code and shall be considered part of the requirements of this document." It does not carry that responsibility out to the documents referenced within the referenced publications. There are situations, however, that common sense and logic will dictate that use of a secondary reference is necessary. For example, NFPA 5000 requires the use of sprinkler systems that comply with NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2002 edition. A sprinkler system with an adequate volume of water, but inadequate pressure, would need to have a fire pump included as a part of the design package. NFPA 13: 15.2.2 permits fire pumps installed in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection* to serves as an acceptable source of water. NFPA 20 is not referenced in NFPA 5000, but logic would dictate that it is the best method to regulate the design of the pump system. Such criteria, however, is best called out in the construction plans and specifications that are submitted for review.

A - Sub-bullet. In certain cases, NFPA 5000 references different editions of material standards than those found within ASCE 7-02, Section 9.0, *Earthquake Loads*. For example, NFPA 5000 references ACI 530-02 for masonry design, while ASCE 7-02, Section 9.11 references ACI 530-99 for the design, construction and quality assurance for masonry components that resist seismic forces. In addition, Appendix A.9.11 of ASCE-7

provides supplementary provisions for the seismic compatibility between ASCE 7-02 requirements and those of ACI 530-99.

This is an example of lag timing of the various code development processes involved. ACI had not finished processing ACI 530-02 in time to make the appropriate modifications in ASCE 7-02. However, ACI had finished processing ACI 530-02 in time to be referenced in NFPA 5000.

It is certainly in California's best interests to adopt and enforce the most up-to-date codes and standards available. Consequently, as part of the review process, California will want to compare the seismic provisions of ACI 530-99 with ASCE 7-02's modifications to those of ACI 530-02 to determine if there are conflicts and how best to deal with those conflicts.

This issue is not unique to NFPA, but also finds its way into the other model building code documents, past and present.

7. How are structural elements and systems that bridge several different referenced publications handled? Which publication takes precedence?

A. As with any model code, there are structural elements and systems that bridge several different reference publications. Take, for example, the seismic requirements for composite construction found in Section 44.2.4 of NFPA 5000. In this section alone, four reference documents are called out – ACI 318, AISC LRFD, ASCE 7 and AISC Seismic, Part II. When necessary, the code language indicates which publication takes precedence. For instance, Section 44.2.4.2 indicates that the ASCE 7 *R* factor can be used when the structure is designed and detailed in accordance with the provisions of AISC Seismic, Part II.

8. How are the performance-based design options outlined in chapter 5 to be translated into enforceable design requirements? For example, Section 5.2.3.2 Serviceability Performance states "…structures shall not experience permanent deformation or deflection that is troubling to occupants or disruptive to building contents…" What criteria would be used to determine compliance with this requirement?

A. All model building codes, including NFPA 5000, have allowances for the use of alternative materials and methods of construction. But only NFPA 5000 establishes clear, concise goals and performance-based design provisions within the model building code for when this design option is utilized. The goals and objectives established in chapter 4 and the performance-based design provisions in chapter 5 establish a methodology for building owners, designers, and enforcers to utilize in order to establish equivalencies for compliance. No other building code integrates this level of support to the use of alternate materials or methods of construction.

The complexity and sheer amount of design, modeling, and documentation-preparation time associated with a performance-based design will severely limit the use of the

performance-based options to unique projects. As with any alternate design, material, or method of construction utilized under the existing California Building Code, stakeholders (which include the code enforcer) are expected to begin working together at the project inception stage with the task of determining equivalency. The burden is placed on the design team to translate the performance criteria into measurable design elements. NFPA 5000 provides the methodology for determining equivalency.

9. Describe the services that NFPA currently provides to enforcement agencies for code support.
    a. Does NFPA provide interpretation services for questions on the referenced publications?
    b. Does NFPA currently provide product evaluation services?
    c. Does NFPA currently provide certification programs for inspectors, special inspectors, and plan reviewers? If so, please identify each type of testing and certification program.

A - 9a. NFPA has provided interpretation advisory services for many decades. In fact, NFPA responds to more that 30,000 interpretation requests each year. NFPA has a diverse technical staff of 120 professionals from appropriate disciplines to provide advisory services. NFPA's staff is composed of the following professions: Architecture, Building Officials, Chemical Engineering, Electrical Engineering, Engineering Physics, Fire Officials, Fire Protection Engineering, Mechanical Engineering, and Structural Engineering.

NFPA provides interpretation advisory services to NFPA members and to jurisdictional representatives at no charge. As an enforcing agency, OSHPD staff would receive the benefits of this service at no charge, regardless of membership status with NFPA. Instructions for taking advantage of this service are found on NFPA's Web site. Interpretation assistance may be in the form of telephone calls, e-mail, or letters. While NFPA staff strives to answer these requests immediately, verbal interpretations will be handled within one to two business days and written responses are handled within 5 to 10 business days.

Formal interpretations (see pages 60-61 of the 2003 NFPA Directory) are actually processed by our Technical Committees and can take three months since the responses are letter balloted by the Technical Committee members. If a formal interpretation is requested, it must be submitted on a form, which is available online. Formal interpretations are then processed through the appropriate NFPA Technical Committee, and once finalized are published and available as part of a subscription service.

This interpretation advisory service applies to the building code and also to questions on sprinklers, electrical systems, fire alarm systems, hazardous materials, or any of the subjects noted in the NFPA referenced documents listed in Chapter 2 of NFPA 5000.

NFPA will provide interpretation advisory service regarding referenced documents not promulgated by NFPA relating to applicability within the NFPA code. Though

discussion may occur regarding the technical details of a referenced document not promulgated by NFPA, the requestor will be advised to seek interpretation assistance from the promulgating organization.

NFPA also provides answers to Frequently Asked Questions about the codes on the NFPA Web site. These FAQ's are available free of charge.

NFPA will be issuing the first edition of the NFPA 5000 Handbook in November of 2003. This handbook will give added examples and cite some of the background information for application of the various code requirements. Other reference materials also are under consideration.

A - 9.b. NFPA is in the process of finalizing a partnership with IAPMO for the creation and operation of a product evaluation service to assess the ability of technologies and products to meet requirements included in NFPA 5000. IAPMO Research and Testing and IAPMO Testing and Services have been a major source for independent testing, research, and technical services for a wide variety of construction related products. IAPMO reports are utilized in dealings with jurisdictions including the City of Los Angeles, California Energy Commission, and others.

A - 9.c. NFPA currently provides a number of certification programs, including: Fire Inspector I, Fire Inspector II, Fire Plans Examiner, Certified Fire Protection Specialist, Certified Building Inspector, and Certified Building Plans Examiner. NFPA is currently in the process of developing a Certified Building Official program, as well as a Residential Electrical Inspector, and Master Electrical Inspector program.

NFPA allows transfers into these programs for persons currently certified under other reputable certification programs. This allowance is intended to give credit to the work already completed in an existing program. Doing so allows renewal into the NFPA certification program without the need of retaking the examination.

In general, the testing programs for these certification programs include a four-hour, open-book exam that consists of approximately 100 multiple-choice questions. The exam asks participants to recall specific information, apply knowledge to new or changing situations, and analyze facts to determine solutions.

Recertification is required every three years, and applicants must submit documented evidence of a total of 50 – 60 (depending on the program) professional development credit points from the following categories:

- Training
- Instruction
- Professional practice
- Publications
- Membership in professional organizations

The U.S. Department of Veterans Affairs has approved the CFPS, CFI, and CFPE Certification Programs for reimbursement of examination fees.

Additionally, NFPA develops and promulgates standards for professional qualifications that are recognized by many other organizations. These professional qualifications standards include firefighter qualifications, fire inspector, and electrical inspector qualifications.

10. Please provide a list of referenced publications that may be required in order to plan review an acute care hospital, skilled nursing facility, licensed clinic, and/or correctional treatment center. Please provide a separate, comprehensive list (not a reference to a portion of the model code). Please provide an estimate of the cost to purchase the required referenced publications.

A. If such a facility is to be eligible for Medicare and Medicaid funding, it must comply with the provisions of the NFPA 101, *Life Safety Code* as required by federal law. Though NFPA 101 is not specifically adopted and enforced by the State of California, it is a reality for acute care hospitals, skilled nursing facilities, licensed clinics, and correctional treatment centers located throughout the state. NFPA 5000 is the only model building code that is closely correlated with NFPA 101. Adoption of NFPA 5000 offers such California facilities not only the possibility for fewer conflicts between NFPA 101 and the next California Building Code, but also considerable cost savings for the facilities.

The vast majority of the non-NFPA publications listed in Section 2.3 will not be needed for plan review purposes. Exceptions might include documents such as:

(a) ACI 318, *Building Code Requirements for Structural Concrete*
(b) ACI 530/ASCE 5/TMS402, *Building Code Requirements for Masonry Structures*
(c) AF&PA ASC & LRFD
(d) AISC ASD & LRFD
(e) AISC Seismic, *Seismic Provisions for Structural Steel Buildings*
(f) AISI-NASPEC, *North American Specification for the Design of Cold-Formed Steel Structural Members*
(g) ASCE 3, *Standard for the Structural Design of Composite Slabs*
(h) ASCE 7, *Minimum Design Loads for Buildings and Other Structures*
(i) ASCE 8, *Standard Specification for the Design of Cold-Formed Stainless Steel Structural Members*
(j) ASCE 19, *Structural Applications of Steel Cables for Buildings*
(k) ASCE 24, *Flood Resistant Design and Construction*
(l) ASHRAE 62, *Ventilation for Acceptable Indoor Air Quality*
(m) ASHRAE 90.1, *Energy Standard for Buildings Except Low Rise Residential Buildings*
(n) ASHRAE 90.2, *Energy-Efficient Design of Low-Rise Residential Buildings*
(o) ASME A17.1, *Safety Code for Elevators and Escalators*
(p) ICC/ANSI A117.1, *American National Standard for Accessible and Usable Buildings and Facilities*
(q) SJI, *Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders*

(r) *Uniform Mechanical Code*
(s) *Uniform Plumbing Code*

It is important to note that these standards are also referenced in the IBC and must be used with that document, since they are also considered part of that building code.

NFPA has not calculated the cost of these other standards. However, NFPA offers free training and associated code books to support statewide adoption of its building code. Since NFPA 5000 also references other NFPA codes and standards, those major NFPA standards will be made available free of charge to code enforcers who attend NFPA's complimentary training sessions.

11. Please provide a list of referenced publications that may be required in order to field review construction of an acute care hospital, skilled nursing facility, licensed clinic, and/or correctional treatment center. Please provide a separate, comprehensive list (not a reference to a portion of the model code). Please provide an estimate of the cost to purchase the required referenced publications.

A. Field reviewers are expected to have the rudimentary skills outlined for plan reviewers in item 10 above. NFPA 5000, the referenced NFPA codes and standards, and ICC/ANSI A117.1 should suffice for field review. The NFPA documents will be provided free of charge to code enforcers who attend the free training sessions offered by NFPA to support statewide adoption of NFPA 5000, as indicated above. A copy of ICC/ANSI A117.1 is currently $25.

Response by the International Code Council to Questions from the California Office of Statewide Health Planning and Development (OSHPD)

June 2, 2003

Questions Related to Structural Provisions

1. Describe the acceptance criteria used to select referenced publications for the code.
a. Are there standards for style and format?
b. What criteria are used to determine enforceability of the referenced publications?
c. Is the participation of enforcement agencies in the development of the referenced publications a consideration?
d. How are the issues of referenced publication cost, availability, and policies on updates and errata considered?

The ICC has an "ICC Code Development Process" that describes the requirements in order for a standard to be considered for reference or to continue to be referenced by the ICC family of codes. Section 3.6 in that document, provided as an attachment to this response, addresses the criteria covering this subject. There are no requirements for a particular style or format of text presentation and there is no specific requirement that the standard development committee have voting membership for those that enforce the standard themselves. The reason being that a true consensus process would include a number of those enforcers to maintain a proper balance and to get the view of those who have to deal with its contents daily. The ICC is very concerned about the affordability of referenced standards and has an Ad Hoc Committee on the Use of Referenced Standards well underway. This group is intended to review the current usage of standards in the ICC codes and make recommendations as to the usefulness of the standard and how its information should be provided.

2. Describe the methods used to review referenced publications cited in the structural chapters, prior to adoption into the code.
a. What process is used to evaluate and amend the referenced publications?
b. How many individuals review each publication?
c. How much time is allotted to the effort?
d. Is there a written public record of the findings and recommendations of the reviewers?

The ICC code change process is used to evaluate the inclusion of a new or update to an existing reference document. Staff reviews a code change proposal that contains a referenced standard and sufficient copies of the standard must be provided to the ICC committee responsible for the applicable code for them to evaluate. The staff secretariat first reviews the standard for compliance with the

ICC criteria for referenced standards contained in the procedures mentioned above under question 1. The proponent of the code change with the referenced standard must make their case for adoption and use of the standard before the applicable committee(s) at the code change hearings. As such the staff, applicable ICC committee(s) and any and all interested and affected parties who choose to would review each publication and the context within which it would be referenced in the subject code. Staff would typically have 6 months from submittal to the first code hearing to review all proposed code changes. The committee would be provided those changes and relevant documentation about 3 months before the first code hearing and all code changes are published for public review at least 2 months before the first code hearing. These dates establish some starting point for review of these documents. The amount of time expended by the staff, committee and interested parties on the review of each related change cannot be estimated precisely. Experience shows it to be significant.

It should also be pointed out that ICC staff and jurisdictional members also monitor or participate in the efforts of many standards committees. For instance ICC staff is involved with ASCE 24 and recently attended their last meeting in St. Louis in mid-May 2003. Such involvement ensures, among other things, that if and when revisions to standards referenced in the codes are submitted for consideration ICC staff is fully able to address their potential application in the I-Codes. The results of the staff review of standards with respect to their conformance to the ICC procedures for reference standards are published with the applicable code change in the monograph containing all code changes that is part of the public record.

3. Identify and describe the duties of the individuals responsible for coordinating referenced publications.
a. How is the scope of the referenced publications (as applied in the code) determined?
b. What is the process for identifying and remedying conflicts?
c. How many individuals review the referenced publications for potential conflicts?
d. What are the criteria used to judge compatibility of the referenced publications with other structural requirements of the code?

The ICC Correlation Committee handles the coordination of ICC codes. This committee meets after the final outcome of the code development cycle to hear and resolve any conflicting actions. This is handled by the Manager of Codes who compiles the information for committee review. The original code committee, staff, audience, members in attendance at the Final Action Hearing and the Correlation Committee all verify the coordination of the provisions and each plays a vital role in the publication of coordinated codes. Of note each I-Code does contain a provision that establishes an order of priority. Where

differences occur between the code and a referenced standard the provisions of the code take precedence.

4. Reference publications produced by the steel, concrete, masonry, and timber industries are valuable resources. However, they also reflect the bias of the industry group, and may include structural systems or methods of construction suitable only for areas of low seismic risk. What processes are used to screen the referenced publications to ensure systems of low ductility are not constructed in regions of high seismic risk?

Pursuant to the ICC procedures related to reference standards, standards and other documents referenced in the I-Codes must have been developed via a consensus process such as prescribed by ANSI or ASTM. Because those processes provide for balance of interested and affected parties it is not possible under the ICC procedures for a standard or other document as described above to find its way into the I-Codes, unless it were developed via a consensus process. If developed through such a process the probability that any one industry group could bias the standard is very remote and if they did the process is such that those adversely affected industries would likely appeal to the standards developer and surely make their views known should the standard or other document find its way into the ICC code change process.

With respect to the seismic-related portion of the question, the provisions that require certain structural systems over another in particular seismic hazard areas are usually not found in the standards produced by industry but rather in the provisions that come from the National Earthquake Hazard Reduction Program (NEHRP). This group was set up specifically to address the creation of a national set of criteria to reduce damage to buildings due to earthquakes. This group has a number of representatives that do include code officials and structural engineers. There have been representatives from California on the committees involved with this group in the past. The members of ICC are assured that the concerns over the use of many types of construction are addressed through this Federal activity. If derived from industry documents the checks and balances previously described above would ensure that the subject document was not referenced in the I-Codes.

5. The relationship in Chapter 16 between the IBC seismic provisions and ASCE 7 is very confusing. The IBC directs the user to ASCE 7 for specific aspects of the design.

5.1. To what extent does this direction supplant the IBC provisions?

Section 102.4 of the IBC states that the codes and standards referenced in the IBC are to be considered part of the code to the prescribed extent of each reference and where differences occur between provisions of the code and referenced standards, the provisions of the code apply. Based on this section,

whenever Chapter 16 of the IBC references a specific section of ASCE 7, the provisions of ASCE 7 must be followed. If there were specific provisions in ASCE 7 that are in conflict with provisions in the IBC, the provisions of the code would apply.

5.2. For example, building irregularity is checked using ASCE 7, Section 9.5.2.3. This procedure requires that the forces used shall be those in ASCE 7, Section 9.5.5. Does this mean that the forces in ASCE 7 Section 9.5.5 supercede those in the corresponding section of the IBC, should they differ?

Section 1616.5 of the IBC requires that buildings be classified as regular or irregular based on the criteria prescribed in Section 9.5.2.3 of ASCE 7. As for determination of forces using the equivalent lateral force procedure, Section 1617.4 of the IBC has no specific provisions but references Section 9.5.5 of ASCE 7 for determination of forces using the equivalent lateral force procedure.

5.3. Similar issues occur in the nonstructural and nonbuilding structure sections. For example, QA requirements for nonstructural components are part of ASCE 7, Section 9.6, which is referenced in IBC Section 1621. Do the ASCE 7 QA requirements supercede parallel (but different) requirements in Chapter 17?

Section 1621.1 of the IBC specifically references Section 9.6 of ASCE 7 with some modifications as indicated in the IBC. An integral part of Section 9.6 of ASCE 7 is Section 9.6.1.7 on construction documents, which is not modified in the IBC. Section 9.6.1.7 of ASCE 7 refers to Table 9.6.1.7, which in turn references Appendix A.9.3 for quality assurance. Therefore, the provisions of Appendix A.9.3 of ASCE 7 do apply to quality assurance requirements for architectural, mechanical and electrical components and systems.

6. The IBC seismic provisions eliminated the requirement that the Seismic Design Category (SDC) be based on the more restrictive of the requirements for short or long period structures. This means that unreinforced masonry and concrete structures may now be constructed in many areas of California, a practice outlawed since the 1930's. What technical justification of these low ductility systems was provided, showing they provide sufficient safety?

The elimination of the requirement that the Seismic Design Category be based on the more restrictive of the short and long period design spectral accelerations includes several restrictions. In order to use the exception, all of the following must be met: (1) the approximate fundamental period of the structure, T_a, in each of the two orthogonal directions must be less than $0.8T_s$, (2) equation 9.5.5.2.1-1 of ASCE 7 (short period structure base shear) must be used to determine the seismic response coefficient, Cs, and (3) the diaphragms must be rigid as defined in Section 1602 of the IBC.

The technical justification for the exception (code change proposal S39-02) in Section 1616.3 of the 2003 IBC was that under the 2000 IBC (1997 NEHRP) provisions, short period buildings ($T_a < T_s$) may be unfairly penalized by having their Seismic Design Category controlled by the long period MCE ground motion (S_1) or design spectral response acceleration (S_{DS}) even though the structure only responds in the short period, acceleration controlled domain of the spectrum. The 0.8 factor was included to ensure that $T < T_s$ in order to provide some margin that would prevent excursions into the long period, velocity-controlled range. The requirement that equation 9.5.5.2.1-1 of ASCE 7 be used is redundant because the base shear of structures with $T_a < 0.8T_s$ is already governed by the short period portion of the response spectrum. The requirement that diaphragms be rigid was a modification made by the code change committee in response to concerns by the BSSC CRSC, so this additional restriction was added to ensure that the exception only apply to rigid structures that are less likely to experience period elongation. The ICC record of the code change cycle under which the 2003 IBC was developed indicates that code change S39-02 as modified had the support of both the BSSC CRSC and the BSSC TS-2 committee.

The ICC believes that the real issue here is that under the 2003 IBC it is possible to have buildings in California that are classified in Seismic Design Category C or even B, depending on Site Class. The issue with the new exception to Section 1616.3 in the 2003 IBC is that there are regions in the central valley that would have the Seismic Design Category controlled by the long period ground motion, and it is possible to have buildings in California that are classified in Seismic Design Category C or even B, depending on Site Class. [With respect to Site Class, under the 2000 IBC, for Site Class B soil ($F_a = 1.0$, $F_v = 1.0$), which is the best soil possible for the west coast, in order for $S_{DS} < 0.33g$ and $S_{D1} < 0.133g$ corresponding to Seismic Design Category B (for Seismic Use Group I & II), the MCE ground motion would have to be $S_S < 0.50g$ and $S_1 < 0.20g$. Based on the USGS maps and IBC Figures 1615(3) and 1615(4), there are regions of central California with $S_S < 0.50g$ and $S_1 < 0.20g$. Under the 2003 IBC, buildings that meet the exception to Section 1616.3 need only meet $S_{DS} < 0.33g$ in order to be in Seismic Design Category B (for Seismic Use Group I & II). Under the exception, it is possible to have buildings on Site Class C soil and be in Seismic Design Category B. In this case the MCE ground motion would have to be $S_S < 0.42g$. Based on the USGS maps and Figure 1615(3) of the IBC, there are some regions of central California with $S_S < 0.42g$.]

Under the IBC, buildings in Seismic Design Category B would be permitted to be constructed with ordinary concrete moment frames, ordinary plain concrete shear walls, ordinary plain masonry shear walls, and ordinary plain prestressed masonry shear walls. Buildings in Seismic Design Category C would be permitted to be constructed with intermediate concrete moment frames, detailed plain concrete shear walls, ordinary reinforced masonry shear walls, and intermediate prestressed masonry shear walls. Historically these types of

construction have not been permitted in California under the UBC because California is in either Seismic Zone 3 or 4.

This issue could be mitigated by the state agencies (DSA/HCD/OSHPD) through the state amendment process, and the Building Standards Commission could make an amendment for state owned buildings not otherwise regulated by state agencies. However, at the present time there is apparently no way to make a global amendment that affects all occupancies. This is something that would have to be done either by jurisdictions at the local level or via legislation at the state level.

7. If a referenced publication in turn references other documents, are these documents also considered to be a part of the building code? If not how is the referenced publication to be enforced?

The IBC sometimes references different editions of material standards than those in ASCE 7-02. For example, IBC references ACI 530-02 for masonry design, while ASCE 7-02 is based on ACI 530-99. Similarly, IBC references AISC Seismic Provisions for Structural Steel Buildings 2002, while ASCE 7-02 is based on AISC Seismic 97, with Supplement 2. Where there are technical differences, which edition of the material reference is enforced? If a version of a standard different from that specified in ASCE 7-02 is enforced, what steps have been taken to ensure that compatibility in design assumptions between ASCE 7 and the material standard is maintained?

If a standard that is referenced by the code in turn references another standard, then that second standard is considered to be referenced by the code. Was this not the case, there would not be a complete "chain" of provisions. If any were found to be non-compliant with ICC rules for referenced standards the code change proposal to reference that standard would be addressed as discussed above under question 2. A good example is Section 1903.6 of the 2003 IBC. This section references Section 3.6 of ACI 318. Subsection 3.6.5 of ACI 318 references ASTM C 494 and ASTM C 1017. The 2003 IBC does not make direct reference to either ASTM C 494 or ASTM C 1017, but they are indirectly referenced by the reference to Section 3.6 of ACI 318 in Section 1903.6 of the 2003 IBC. In this situation the designer must comply with the ASTM standards and therefore they too are considered an extension of the code.

With respect to the example above concerning ASCE 7, if such conflicts are known to currently exist then they should be identified to ICC staff who will notify the ICC Correlation Committee or the appropriate ICC Code Council. If there is an issue with various referenced editions of the same standard in the ICC codes, the Ad Hoc Committee on the Use of Referenced Standards would look at those standards to see if a revision to the code needs to be made. It must be noted that at times in the past, a code change proponent and the membership have agreed to use an older edition of a given standard for peculiar reasons.

8. Describe the services that ICC currently provides to enforcement agencies for code support.
a. Does ICC provide interpretation services for questions on the referenced publications?
b. Does ICC currently provide product evaluation services?
c. Does ICC currently provide certification programs for inspectors, special inspectors, and plan reviewers?
d. If so, please identify each type of testing and certification program.

The ICC provides interpretation services, product evaluation services, and certification programs for personnel. These are described below.

Interpretations

The ICC offers three types of interpretations: telephone, written staff and formal published interpretations. Over 100,000 telephone interpretations are provided each year. An informal written staff interpretation can be developed and would go through an internal peer review before being sent to the requesting party. Over 5,000 written interpretations are issued each year that are a formal, published position of the ICC that would be developed with staff support through an ICC Interpretation Committee.

Turnaround time for a phone-in interpretation is in the order of hours. A written staff interpretation request receives a response in five days for a single response. More complicated responses will understandably take more time and the customer is notified of such. Request for a formal published position takes a couple of weeks.

The code interpretation policy of ICC outlined above is essentially the same as that previously offered to those in California by ICBO. These services are available free of charge to jurisdictions (e.g. enforcement agency staff) that have adopted the I-Codes. The ICC also offers free telephone and email code opinion services to ICC members. As both a member and an enforcement agency, staff of the CA OSHPD would be provided these services at not charge.

Evaluation Services

The ICC-ES currently provides a product evaluation program for use by enforcement agency staffs to ascertain code conformance of products with the 2003 I-Codes (and other codes the applicant would like addressed by the evaluation report) as described in materials attached to this response.

The process starts with an application and fees being filed by an individual or company seeking recognition of a material, product, component or assembly, hereafter called product. If the product is deemed to be fully regulated by the

code, the supporting data submitted by the applicant is reviewed by staff engineers to determine whether adequate justification has been submitted to make this determination. A key element for any test data submitted is that it must be generated by an approved laboratory. The ICC-ES definition of this is that the laboratory must be accredited, for the tests they have conducted, by an accreditation body which can trace its recognition to the International Laboratory Accreditation Cooperation, the international body for accreditation. International Accreditation Service (IAS), a subsidiary corporation of ICC, is one of three current domestic accreditation bodies that have this recognition. When the staff engineer has been satisfied that the data submitted justifies compliance with the appropriate 2003 International Code, a draft of the report is prepared for approval by the ICC-ES Evaluation Committee. Subsequent applications under the criteria are processed and released by the ICC-ES staff based on the Committee's earlier input.

Where the product is not addressed or adequately addressed by the code to assure fairness in issuing multiple evaluation reports on a product, an acceptance criteria is developed for consideration and approval by the ICC-ES Evaluation Committee which is composed of code officials whose only interest is public safety. The acceptance criteria, upon approval by the Committee, is then used as the basis of review by the ICC-ES staff as described in the previous paragraph.

The acceptance criteria process starts with discussions between the applicant and the ICC-ES project engineer to determine what type of recognition the applicant seeks under the I-Code and legacy codes, if any are being sought. The project engineer then develops a proposed acceptance criteria to determine compliance with the code. For innovative construction not addressed by the code, compliance is determined under Section 104.11 of the IBC. (Alternative materials, design and methods of construction and equipment). In the process of developing the proposed document, the engineer may consult with independent experts in the appropriate field.

Upon completion of the proposed document, a notice for a public hearing before the Evaluation Committee is announced at least one month before the hearing date. The notice is sent to all known interested parties as well as being posted on the ICC-ES web site. The proposed document is available for downloading on the web site at that time. At the hearing, all written comments submitted earlier and verbal comments at the hearing are evaluated by the ICC-ES staff and Evaluation Committee. Several iterations of this process may be necessary before the Evaluation Committee is satisfied that the document meets the needs of the code official under the appropriate codes. The approved acceptance criteria are then posted on the ICC-ES web site for review and use by any interested party concerning compliance with the I-Codes and legacy codes. The open process provides the basis of receiving the most recent technology

available on the subject, and establishes a uniform and equitable basis for recognition of competitive products.

Evaluation of some fairly simple and basic products fall between what is required by acceptance criteria and specific code requirements. Where there is no imminent threat to public safety, these types of products can be reviewed after an "evaluation guideline" is developed. This document is a published policy for evaluation reports developed by the ICC-ES staff. The guideline is placed on the ICC-ES web site where comments from interested parties are solicited. The final document is approved by the Evaluation Committee without a formal public hearing as for acceptance criteria. However, if there be concerns expressed by the Committee or interested parties, guidelines are declared acceptance criteria, requiring that the public process be followed.

All applicants for products recognized in ICC-ES reports must be under a manufacturing or fabrication quality control program. Where listing is required by the code, an inspection agency administers the program. Any inspection agency doing this work must be approved by ICC-ES. Since there is no international agreement for accreditation of inspection agencies, IAS accreditation is predominately used as the basis of approval provided it is in the field of expertise necessary. Where listing is not required by the code, ICC-ES reviews the quality control manuals and performs an initial inspection of the facility. Thereafter it monitors the product through its reexamination process every year or two years, with onsite inspections as necessary.

One of the appropriate processes described above is repeated when technical changes or additions to the report require revisions to acceptance criteria or evaluation guidelines.

<u>Personnel Certification</u>

During the past three decades, the ICC - through its predecessor Model Code Organizations - has developed the nation's most robust and prestigious professional certification credentials for the code administration professions. Through the ICC, nationally recognized certifications are available for 54 different code administration professions, including residential and commercial inspector, permit technician, plans examiner, special inspector, and building official. A complete listing of these programs has been provided to DSA as an attachment to this response. Additional information on these programs is also available on the ICC web site.

Nearly 70,000 individuals hold "current" certification through ICC, with these certificates maintained on a triennial basis through re-examination or professional development activities. ICC certification is recognized by most of the states which license or otherwise regulate code administrators, including California (AB 717).

9. Please provide a list of referenced publications that may be required in order to plan review an acute care hospital, skilled nursing facility, licensed clinic, and/or correctional treatment center. Please provide a separate, comprehensive list (not a reference to a portion of the model code). Please provide an estimate of the cost to purchase the required referenced publications.

The following is a list of key structural standards that may be required for design and plan review for the types of buildings listed above. Depending on the scope of the project, additional standards may be required. In addition, some of these standards may serve as reference documents.

1. *ASCE 7-02*
2. *ACI 318-02*
3. *AF&PA NDS -2001 (ASD)*
4. *AF&PA/ASCE 16-95 (LRFD) (If applicable)*
5. *ACI 530-02/ASCE 5-02/TMS 402-02*
6. *AISC ASD 1989 & Supplement No. 1 (2001)*
7. *AISC LRFD 1999*
8. *AISC HSS 2000*
9. *NASPEC 2001 (Formerly AISI)*
10. *AISC Seismic 2002*
11. *IBC-ASTM Book of Standards (Contains all ASTM Standards referenced in IBC Chapter 35)*
12. *ASCE 24-98: Flood Resistant Design and Construction*
13. *AWS D1.1-2000: Structural Welding Code-Steel*
14. *AWS D1.3-98: Structural Welding Code-Sheet Steel*
15. *AWS D1.4-98: Structural Welding Code-Reinforcing Steel*

The costs to obtain the aforementioned standards will vary depending on whether the jurisdiction is a member of a particular standard developing organization and on the quantity of each standard purchase. An approximate cost based on single unit member pricing would range between $1,000 and $1,100 and takes into account the savings from purchasing the IBC-ASTM Book of Standards, versus purchasing each ASTM standard separately. If this document were not available through ICC the cost to procure separate copies of those ASTM standards would be considerably more.

10. Please provide a list of referenced publications that may be required in order to field review construction of an acute care hospital, skilled nursing facility, licensed clinic, and/or correctional treatment center. Please provide a separate, comprehensive list (not a reference to a portion of the model code). Please provide an estimate of the cost to purchase the required referenced publications.

The following is a list of key reference standards that may be required for field inspection for the types of buildings listed above. Depending on the scope of the

project, additional standards may be required. In addition, some of these standards may serve as reference documents.

1. *ACI 318-02*
2. *ACI 530-02/ASCE 5-02/TMS 402-02*
3. *AISC ASD 1989 & Supplement No. 1 (2001)*
4. *AISC LRFD 1999*
5. *AISC HSS 2000*
6. *NASPEC 2001 (Formerly AISI)*
7. *IBC-ASTM Book of Standards (Contains all ASTM Standards referenced in IBC Chapter 35)*
8. *AWS D1.1-2000: Structural Welding Code-Steel*
9. *AWS D1.3-98: Structural Welding Code-Sheet Steel*
10. *AWS D1.4-98: Structural Welding Code-Reinforcing Steel*
11. *AF&PA NDS -2001 (ASD)*

The costs to obtain the aforementioned standards will vary depending on whether the jurisdiction is a member of a particular Standard Developing Organization or based on the quantity of each standard purchase. An approximate costs based on single unit member pricing would range between $770.00 and $870.00 and takes into account the savings from purchasing the IBC-ASTM Book of Standards, versus purchasing each standard separately.

Questions Related to Fire and Life Safety Provisions

1. Application of a consistent code throughout the country is an important consideration. To date, what state and local jurisdictions have adopted the International Building Code?

A list that identifies the state and local adoption status of all I-Codes is provided as an attachment to this response. At the Federal level I-Codes have been referenced and recognized by the CPSC, DOE, DoD, FEMA, GSA, HUD and OMB.

2. The IBC allows heights and areas that are much larger than what has historically been allowed in the UBC and CBC. What justification was provided to increase the allowable heights and areas so drastically?

The allowable heights and areas are an increase over what was found in the 1997 UBC. The committee that prepared an initial draft of an IBC, in reviewing all of the heights and areas that were used in the model codes at that time, found that to do a proper review a close look at the impacts of these values had to be done considering both new construction and construction on existing buildings. It was found that the values from more restrictive tables did not necessarily adversely affect the construction of a new building since during the conceptual and design stages such areas could be accounted for in the design and

continued use of the building. However, in existing construction, there were many instances of restrictive values imposing a limitation on the uses that could be placed within a given structure or on any planned addition to such building. This is due to the construction of a structure under a previous code that may have allowed an additional amount of area that would be expected to be used when needed. More restrictive areas, in particular, could cause the planned work to be abandoned as a result.

That drafting committee also investigated the information available on fire losses related to building size. Such data was not found nor was it provided to the committee by anyone in attendance. To date, ICC is very interested in any such information that can be related to this topic and continues to encourage anyone to forward such information to Paul Armstrong at the ICC office in Whittier, CA.

3. The IBC offers substantial "trade-offs" in construction for automatic sprinkler systems. It is very likely that an earthquake may render such sprinkler systems inoperative in areas of high seismic activity. Additionally, sprinkler systems may be shut off for maintenance or service. How are buildings protected against fire, where sprinkler systems are used for trade-offs and then fail to operate when needed?

The issue is really the performance of any such fire protection before, during and after a fire, earthquake or any such event. The building code provisions intend that any such fire protection be in place and functional when and if such an event should occur. As with the World Trade Center collapse, the issue is also with passive fire protection as well as active suppression. The codes are set up to ensure that such fire protection if designed, constructed and maintained properly will perform in the manner intended. This is reflected in the excellent fire loss records of sprinklered office buildings. The building code works together with the fire code among others to ensure the continued operation of such systems. It is when the proper maintenance of both active and passive fire protection systems is not done, that such problems can arise.

4. UBC section 302.1, exception 2.4 allows a kitchen not to be separated from the dining area of which it is a part. Is this allowed in the IBC? If so, where?

The IBC handles this in the Occupancy classification of restaurants themselves. The Group A, Division 2 Occupancy classification includes the kitchens that are a part of the assembly use In Section 303.1 of the IBC.

5. Sprinkler requirements for Group I occupancies are confusing and/or contradictory. Section 903.2.5 requires sprinklers *throughout buildings with a Group I fire area*. Table 903.2.13 (2003 IBC draft) refers to section 407.5 for "additional required suppression systems." Section 407.5 requires sprinklers *throughout smoke compartments containing patient sleeping rooms* in I-2 occupancies. Are sprinklers required throughout buildings, or only in smoke

compartments containing sleeping rooms in hospitals? Do fire walls create separate buildings for the purpose of fire sprinklers? (Section 903.2.5 requires sprinklers “throughout buildings,” and section 705.1 says that portions of buildings separated by fire walls shall be considered separate buildings. Are sprinklers allowed to stop at the fire wall?)

The sprinkler requirements found in Section 903.2.5 of the IBC set out the general rule that throughout all buildings containing such uses an automatic sprinkler system must be installed. Table 903.2.13 of the IBC then provides additional requirements and, for these uses, sends the user to Section 407.5 of the IBC. The first sentence in Section 407.5 is redundant as it requires the sprinkler system in the patient sleeping area, but is necessary to set the stage for the second sentence. The second sentence then follows with the additional requirement of the quick response or residential sprinklers in the patient sleeping area. As for the fire wall in the IBC creating separate buildings for sprinkler requirements, it is true. They are then separate buildings and as such would not be provided with an automatic sprinkler system unless required to do so by another provision of the code. Interestingly, the 1997 UBC only required the sprinkler system to be in the Group I Occupancy portion of the hospital itself; not throughout the entire building containing the use.

Recommendations to OSHPD From Interested Parties

OSHPD received recommendations and comments, in the form of letters and emails, from interested parties. The individuals and organizations, and their stated preference are noted in the following table.

Individual or Organization	NFPA 5000	IBC	1997 UBC	No Opinion
Abraham Torres	X			
CALBO		X		
California Association of Health Facilities	X			
Fire Chiefs, League of California Cities		X		
Central Valley Fire Prevention Officers Association		X		
City of Alhambra		X		
City of Alhambra Fire Department		X		
City of Belvedere		X		
City of Burbank		X		
City of Burbank Fire Department		X		
City of Claremont		X		
City of Clovis		X		
City of Corona Building Department		X		
City of Coronado		X		
City of Daly City		X		
City of Dublin		X		
City of El Cajon		X		
City of Fairfield		X		
City of Foster City		X		
City of Fountain Valley Fire Department		X		
City of Fremont		X		
City of Fresno		X		
City of Glendora		X		
City of Healdsburg		X		
City of Lakeport		X		
City of Livermore		X		
City of Merced		X		
City of Monterey		X		
City of Mountain View Fire Department		X		
City of Rancho Cucamonga		X		
City of Redding		X		
City of Redwood City		X		
City of Rohnert Park		X		
City of San Buenaventura		X		
City of Santa Monica		X		
City of Sebastopol Fire Department		X		
City of Sonoma		X		
City of Suisun City		X		
City of Thousand Oaks		X		
City of Turlock		X		
City of Tustin		X		

Individual or Organization	NFPA 5000	IBC	1997 UBC	No Opinion
City of Union City		X		
City of Walnut Creek		X		
City of West Sacramento		X		
City of Westminster		X		
County of Alameda Public Works Agency		X		
Earl Dillon	X		X	
Fire Chiefs Association of San Luis Obispo County		X		
Independent Code Consultants		X		
Lathrop-Manteca Fire Protection District		X		
Livermore-Pleasanton Fire Department		X		
Marin Builders Association		X		
Marin County Board of Supervisors		X		
Marin County Fire Department		X		
Nevada County Consolidated Fiore District		X		
Newport Beach Fire Department	X			
North County Fire Protection District		X		
Novato Fire Protection District		X		
Orange County Fire Authority		X		
Orange Empire Chapter of the ICC		X		
Rancho Cucamonga Fire Protection District		X		
Redwood City Fire Department		X		
Redwood Empire Chapter ICBO		X		
Robert Rowe	X			
San Joaquin County Fire Chiefs Association		X		
San Mateo County City Managers' Association		X		
Structural Engineers Association of California		X		
Templeton Fire Department		X		
Town of Apple Valley		X		
Town of Corte Madera Fire Department		X		
Tri-Chapter Uniform Codes Adoption and Interpretation Committee		X		
Uniform Fire Code Association	X			
Ventura County Fire Chief's Association		X		
Western Fire Chiefs Association, Inc.	X			
Jack Woycheese	X			

Summary:

Recommends IBC	68
Recommends NFPA 5000	7
Recommends UBC 1997 or NFPA 5000	1